

**IMPACT OF INTERNATIONAL TRADE ON
STRUCTURE OF PRODUCTION,
EMPLOYMENT AND INCOME: AN ANALYSIS
IN INPUT-OUTPUT FRAMEWORK
FOR THE INDIAN ECONOMY**

A thesis submitted in partial fulfilment
of the requirement for the degree of
DOCTOR OF PHILOSOPHY

by
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to the
Department of Humanities and Social Sciences
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Introduction

This dissertation presents an analysis of the impact of international trade on the structure of production, employment, income and prices in the Indian economy. The period of study is from the financial year 1979-80 to 1991-92. This period has witnessed significant changes in the policy framework regarding international trade in India. Prior to the year 1984-85, the policy of import-substitution based industrialisation was followed. Gradual transition to export-led economic policy started from 1984-85, which later prepared ground for further liberalisation of industrial and foreign trade policies during 1991-92.

For sustained growth and development of the Indian economy a comprehensive strategy has to be evolved regarding foreign trade, as it has a close link with the structure of production and investment in the domestic economy. The liberalisation policy with regard to the foreign trade may have very far reaching consequences for any economy, particularly in

terms of domestic capital formation, employment, prices, income generation and its distribution across the regions and the income-groups. This study is an attempt to analyse the various effects of international trade on a large economy, viz. India.

Sources of Data

The basic empirical data for this study have been provided by the Input-Output Tables, Import-Transaction/Coefficient matrices, prepared for the years 1979-80, 1984-85, 1989-90, and 1991-92 by the Planning Commission of India. While the first two Tables were prepared for the Sixth and Seventh Five Year Plans respectively, the same for 1989-90 and 1991-92 were prepared for the earlier proposed draft Eighth Plan (1990-95) and the later revised Eighth Plan (1992-97). The study also utilised data on employment collected by the National Sample Survey Organisation (NSSO) and the Office of the Registrar General of India (for Population Census). The estimates of Gross Fixed Capital Stock were prepared by Perpetual Inventory Method (PIM) for different organised sectors at 2/3 digit level of National Industrial Classification (NIC) specifically for this study. The similar estimates of Capital Stock for the un-organised sectors were prepared on the basis of the Census of Small Scale Industries. These estimates were used to prepare a detailed Capital-Coefficient Matrix for the Indian economy for the year 1989-90. |

Before making these analyses, some adjustments were made to the Input-Output Tables for comparability of data. It involved aggregation of sectors of the economy to a common 46-sector

classification for all the tables. All the tables were also brought to the same price level (i.e. of the year 1984-85) by inflation/deflation with the help of different appropriate price /cost /implicit indices for intermediate inputs, intermediate services, private consumption, government consumption, capital formation, change in stocks, exports ,imports, gross value added and indirect taxes. Even after these adjustments to the I-O tables, some incompatibility has remained and results may be interpreted after taking into consideration the above adjustments.

Methodology

The orientation of this study has been to analyse the real effects of foreign trade on the Indian economy in Input-Output frame-work. So the analyses have been done in semi-closed static I-O model for the period 1979-80 to 1991-92 and projected model for the year 1996-97. The semi-closed Dynamic I-O model has been used to project the structure of production and employment for the future period (beyond 1996-97 upto the year 2000-01) in this study. Since the projected Input-Output table for the period 1996-97 is available, the projections have been attempted with the help of this table for the period beyond 1996-97 by dynamic model. The Capital -Coefficient Matrix as prepared for the year 1989-90 has been assumed to be valid for the period 1996-97.

India is neither a closed economy nor very small one, as such it needs regularly to import some products and raw materials as intermediate inputs. So to treat all imports as undesirable can not be considered as a right view. The previous studies

in India had treated imports as negative final demand or the import-transactions were subtracted from the technology coefficient matrix. Both of these approaches treat imports as leakages from the economy discarding the positive effects of the imports, without which a significant proportion of goods and services can not be produced and the required level of welfare can not be achieved. In this study the imports have been divided into two categories; (a) Complementary- viz., those items which are not sufficient to meet the intermediate demand for full capacity utilisation of the present production structure over a reasonably long period, and (b) Competitive- viz., those items which can be produced in the required quantities in the domestic economy and the imports are due to the fluctuations in production or final demand over a short period.

Special Emphasis

For this purpose the complementary imports have been treated as part of the production structure by endogenising them as a supply vector with exports as balancing demand vector into the technology coefficient matrix. This treatment of foreign trade enables the segregation of enabling and disabling effects of exports/imports on different sectors. For analysing long-term future effects of foreign trade, the effect on capital formation has been analysed with the help of dynamic model. In an Open Static I-O model, the induced effects of income received by the different segments of the domestic economy from exports and the future effects of increased /decreased capital formation in critical sectors due to increased/decreased capital goods imports can not be analysed. In this study the capital formation in India has been divided into domestic production and that which is based

on imported products. The future effects have been analysed with the help of the dynamic model.

Another important aspect of more emphasis on foreign trade is the price structure in the economy. As a result of enhanced emphasis on production for exports and liberalised imports, while certain types of traded goods are likely to be produced more in place of some other goods and services (non-traded). As such it may change the structure of production, employment and income in the economy . Further, as the imports tend to be cheaper and easier to obtain, it may also lead to change in cost of production of various commodities. The price effect in various sectors has been analysed with the help of alternative assumptions regarding the growth of exports and imports scenario in a semi-closed dynamic I-O frame-work. The resulting effects on employment, income, prices and income-distribution have been analysed.

Analysis of Results

The analysis of results showed that the output linkages of various sectors without separating the effect of the complementary imports are significantly higher than the real linkages ascribable to the domestic production sectors.the Semi-closed Input-Output model segregating international trade as a separate sector provides appropriate estimates of output ,labour and income linkages of the domestic sectors.The results also showed that the output linkages of most of the domestic sectors go up in the event of reduction of competitive imports, implying that such imports can be substituted and the economy will be benefitted in terms of output linkages.

Import Intensity

With regard to the direct, indirect import intensity of various sectors in the Indian economy over the years, the results showed that the overall import multiplier, which was going down prior to 1984-85, increased after mild liberalisation of trade during 1984-85 till 1989-90. However it came down during 1991-92, but is going up again after the liberalisation process of 1991. With the help of the dynamic model we have found that the import intensity of intermediate consumption is likely to come down during the future years by 2000 A.D.

In various sectors, it was found that the import multiplier which came down in more sectors till 1991-92, went up in 27 sectors and decreased in 19 sectors. The import intensity of most of the primary sectors, agro-based ,machinery and transport equipment industries is going up over the years. The import intensity of export-oriented sectors is increasing at comparatively faster rate over the years. While overall the import intensity of domestic production process has been going up, .it is likely to go down after 1991-92, but the proportion of imports in final demand is increasing regularly. It is also worth noting that the import intensity of essential imports is going up while that of other imports is comparatively stable. Further the import intensity of private consumption is increasing while that of intermediate consumption is going down.

Export Capability

Another aspect of impact of trade on the economy is the capability of various sectors in providing increasing exports. The analysis showed that prior to the mild liberalisation of

trade during 1984-85 ,the export capability of some primary sectors and chemical based industries increased, the same came down after 1984-85 till 1991-92. As such overall export capability of the economy which increased before 1984-85 ,came down after that period. But since 1991-92 it is increasing in most of the sectors particularly agro-based, machinery & equipment based industries. Overall in the economy also the export capability has been increasing regularly over the years and has increased at faster rate after 1991-92. It may however be stated that the same may come down after 1996-97 marginally. Further it has also been found that the exports are being concentrated more in a few sectors particularly after 1991-92 comparative to the earlier period.

Self-Sufficiency

Self-sufficiency has been one of the main objectives of the planning in Indian economy over the years. It is interesting to note on this aspect that the overall self-sufficiency of the economy had come down by 1989-90 i.e. during the import-restriction phase,while it increased significantly after 1989-90 and particularly after 1991-92. While there were respectively 19,22 and 26 sectors which were deficient in production compared to domestic demand during 1979-80,1984-85 and 1989-90. The number of such sectors reduced to 12 during 1991-92. Thus we see that the trade liberalisation is likely to improve the self-sufficiency of the Indian economy.

The results have also shown that there would not be significant saving in terms of overall quantity of imports due to substitution of essential imports for the intermediate consump-

tion. If efforts are made to substitute most of the essential intermediate imports, the net gain is likely to be little, while more essential imports, which are not feasible for production due to either natural or technological/financial resources may be needed. However, it will be beneficial to substitute the competitive imports as far as possible. It will also help in generating substantial additional output and employment in the economy without necessitating significant additional essential imports.

Output Linkages

The results also showed that output multipliers of more sectors increased prior to 1984-85, but after mild liberalisation of trade, more sectors suffered in terms of output linkages. However after 1991-92 the same are likely to increase in most of the sectors. The Indian economy is inducing more backward linkages than forward linkages, which may be due to comparatively lower share of secondary sector, particularly the large machinery sectors. Overall there are a few sectors which have both high backward as well as forward linkages. It is heartening to note that after 1991-92 the number of sectors in this category is increasing.

Labour Linkages

With regard to the labour linkages in the Indian economy, it has been found that there has been general trend towards declining labour intensity since the early eighties. However after reforms the backward labour linkages are showing signs of improvement in many sectors particularly the primary

sectors, construction and agro-based industries. The forward labour linkages however are increasing in the metal based industries and non-agro-based manufacturing sectors. It is heartening to note that the overall labour linkages are likely to comparatively increase after 1996-97 and by the year 2000 A.D., the same may come back to the level of 1991-92. The labour intensity of exports is coming down over the years. Similarly the effectiveness of complementary imports providing additional employment is decreasing over the years.

Income Linkages

The backward income linkages have increased in more primary sectors and agro-based industries after 1984-85, while forward income linkages increased in metal based manufacturing industries and non-agro-based sectors. There is likely to be adverse impact on income linkages in future years after 1996-97. With the likely growth in the share of trade in the future, most of the sectors are likely to lose in forward labour and income linkages. When we take into account the plough-back effect of consumption in the economy through endogenisation of private consumption and value added in addition to the international trade, we found that forward labour and income linkages of income received by the lower and middle income groups increase, while the backward linkages decrease with the growth in the share of trade. On the other hand the labour as well as income linkages due to income received by the highest income group go down with the growth in the share of trade.

Structure of Production

With regard to the structure of production, it has been found that the shares of primary sectors, metal based manufacturing industries, other transport equipment and services are going down during the eighties. The share of other crops, fishing, animal husbandry, textiles, fertilisers, cement, electricity and other manufacturing sectors are going up over the same period. The concentration of production in a few sectors is going down and more and more new and emerging sectors are coming up at the cost of the traditional sectors. With the help of dynamic model it has been found that the share of agriculture and agro-based manufacturing sectors is likely to go down if the situation with regard to capital formation remains same as at present. The sectors considered important for the development of infrastructure are likely to get more emphasis in the future. These are construction, non-electric machinery, iron and steel, transport services and other manufacturing sectors. The traditional sectors like cereals, other services, animal husbandry, textiles, other food products, other chemicals etc. are likely to lose comparatively in importance. The essential imports are likely to grow at faster rate in next few years.

Cost of Production

The cost of production has gone up with less rate of growth in most of the sectors after the share of foreign trade has increased in the last decade. However the cost of production (in terms of prices) of goods used for final consumption has comparatively increased after mild liberalisation of trade. The imports have become cheaper comparatively. The prices are likely

to increase at lesser rate in the future. The metal based industries will be the main gainers in terms of prices. The labour cost as proportion of total cost is likely to go down with increase in share of trade.

Factors of Growth

With regard to the factors of growth in output during this period, it has been found that the growth in final demand has been the main factor for growth in output, while the growth in exports has also contributed significantly positively. The import substitution and technological change have overall contributed negatively during the period till 1989-90. After 1991-92 however the contribution of import substitution as well as that of technological change was positive towards output. The important factors in the growth of employment as found out by us have been the growth in final demand and exports throughout the period. The growth in labour productivity has contributed negatively for growth in employment during the whole period. The contribution of import substitution and technological change which was negative for employment and income growth prior to 1991-92 has become positive and significant after liberalisation of trade and industry during 1991. This shows that the present technology is more appropriate and adequate for liberalisation of trade in India.

Conclusions

With the help of this study we are able to identify the specific sectors, which should be given particular emphasis in view of their output, labour and income linkages. Further it helps to identify the type of commodities in which the imports can be

substituted without adverse effects to the economy and in which it would not be prudent to substitute the imports. This study may help the policy makers in designing appropriate trade policy for sustainable growth in the economy without adversely affecting the balance of trade. The study may help them in distinguishing among the categories of imports to liberalise or to restrict in view of their direct ,indirect and induced effects on the economy. It may also help the policy makers to put special emphasis on certain sectors for providing maximum employment opportunities in the economy and for generation of income with its appropriate distribution in various income-groups.

**DEDICATED TO
MY
BELOVED PARENTS
AND
ELDER BROTHER**

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CHAPTER 1

BACKGROUND AND PROBLEM SETTING

1.1 Introduction

The earlier industrialisation in India was mainly guided by the Import Substitution Policy with more emphasis on heavy industries to provide basic infrastructure for rapid industrial development. There existed a big technological gap compared to the industrialised countries. Further there was lack of technological manpower, income ,demand and infrastructure for distribution and marketing of goods within the country. As such high priority was accorded in Five Year Plans (FYP's) to growth, equity , self reliance with particular emphasis on the public sector. It was felt necessary due to the highly skewed income-distribution, lack of confidence in the private sector to invest in basic infrastructure projects of long-gestation period as well as to avoid wastage of resources. In this process high emphasis was laid on long-term self sufficiency by creating infrastructure for rapid industrialisation with the help of imported technology. Only in the case of large , capital-intensive machinery, for which technology and finances were not available, import was allowed. Imports were also permitted for the essential raw materials,viz., crude oil and certain scarcity items like foodgrains. Due to this Import Substitution Policy (ISP), Indian manufacturing activity increased in many new areas over the years. However in spite of the ISP the trade-gap increased gradually (the data on trade-gap has been presented latter in this chapter in Table 1.10). While the growth in income increased

rapidly during the seventh plan period (1985-90), the trade-gap also increased alarmingly . Due to these policies, the production suffered in some sectors, which necessitated much more imports indirectly compared to the imports saved in the process. Therefore from the early eighties, the stringent controls on imports were gradually reduced and particularly from the mid-eighties, the imports were liberalised in many sectors, and many types of goods were brought under Open General License (OGL) scheme. Still in late eighties, the trade-gap continued to mount and during the early 1991, a serious foreign exchange crisis was created. As such the structural adjustment programme was taken up and far reaching changes were made in International Trade, Industrial Licensing, monetary and fiscal policies.

In July 1991, the Government of India liberalised the economy in many areas. The major and path-breaking economic policy changes included the following.

- (i) Delicensing in many industries;
- (ii) Privatisation of many sectors;
- (iii) Reduction of Import Duties on many items;
- (iv) Eliminating the Export Subsidy;
- (v) Disinvestment in Public Sector companies;
- (vi) Devaluation of Currency; and
- (vii) Starting the process of Full Convertibility of the Indian Currency.

Besides the above, many incentives were declared for direct foreign investment in major priority sectors in the Indian economy. All the above policy measures were taken in quick

succession. Some of these measures were taken suddenly, while others were taken gradually in instalments. Further measures are in the process of being taken in the near future. These policy measures are likely to affect the structure of production as well as growth of the economy in most of the sectors. The policy of promoting exports is likely to help some sectors in the growth of production but may lead to shortage of inputs for some other sectors and may affect the prices in most of the sectors due to increase or decline in supply particularly in the short run. Similarly the cheaper and easier imports may create demand problems in certain sectors, while the same may help some other sectors with cheaper inputs and machinery. Further with only currency devaluation to support, the exports may also be concentrated in a few sectors without subsidy. Stiff competition in some sectors due to entry of more multinational firms may improve the technology but may also cause production loss in indigenous low-technology goods. All such possibilities need to be examined threadbare as there may be direct, indirect and induced effects of all these policies. Put together, the production in different sectors may be affected quite differently due to vastly different demand and supply conditions as well as price elasticity of demand of various goods.

The country is facing a serious unemployment situation in the current period with employment elasticities going down in many sectors over the years particularly in the organised sector (the data on the observed employment elasticities are being presented latter in this chapter in Table 1.22). With more multinational firms, using capital intensive process of production and having large sizes, entering in our economy, the

employment opportunities may further dwindle. On the other hand, if more exportable goods could be produced by modern firms with cheaper labour in India, more employment could be generated. Thus with the above scenario of policy changes the employment situation in India is going to be affected, which needs to be analysed in great details. Apart from employment, there are many other fears like income-inequality may go up, the price-structure may change in such a way, so as to adversely affect the poor more than the rich. All these possible effects need to be analysed. For these, Input-Output method is very appropriate to analyse the direct, indirect and induced effects of various changes in the policies. The methodology will be presented in the next chapter. Before doing so the present conditions of the Indian economy in various aspects may be presented, so as to understand the implications of different measures clearly. The next paragraphs present the main features of Indian economy in general and in the area of foreign trade in particular.

1.2 Main Features of the Indian Economy and External Trade

1.2.1 Over-all Growth

The Indian economy has been experiencing moderate growth in Net National Product (NNP) till early eighties. During the eighties, however the growth was much faster at over 5 % per annum on an average. But the growth in imports was faster than that of exports over the years. As can be seen from Table 1.1, the rates of capital formation and saving grew rapidly to a satisfactory level during the eighties.

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Table 1.1 : Macro-economic Aggregates of the Indian Economy
 (percentage distribution)

Characteristic	\ Year	1980-81	84-85	89-90	91-92	92-93	93-94	94-95
		1980-81	84-85	89-90	91-92	92-93	93-94	94-95
Growth of N.N.P.		7.5	3.4	7.1	(-) 0.1	4.2	4.2	6.7
Growth of Imports		37.3	8.2	25.1	10.8	32.4	15.3	23.1
Growth of Exports		4.6	20.2	36.7	35.3	21.9	29.9	18.5
Rate of Investment		19.3	19.7	22.5	22.0	21.3	21.6	25.2
Rate of Saving		21.2	18.2	24.0	23.1	22.3	21.4	24.4
Growth of GDP from Mfg.		3.0	6.3	10.5	(-) 1.1	2.1	4.3	9.0

Source Economic Survey, Ministry of Finance, Govt. of India, various issues.

From the above table we observe that in spite of satisfactory level of saving rate, the rate of growth of gross domestic product (GDP) from the manufacturing sector was not good enough for satisfactory growth of the economy as a whole. Further the trade balance was negative year after year. During 1990-91, due to some special circumstances, e.g., the gulf war, break-up of the Soviet Union, the cushion from surplus on invisibles account being not available, serious foreign exchange crisis was faced by the country. Subsequently, the Structural Adjustment Programme for macro-economic stabilisation was launched to reform the Indian economy during 1991. The changes made in the Trade and Industrial policies are presented in the Appendix-I. As a result of these policy changes some changes have been partly experienced by the economy already and some more are likely to be felt in the future. As we observe during this transition, the rates of imports

and exports have shown much more volatility and the rates of saving and capital formation have come down during the first three years after reforms. Similarly the rate of growth of net national product has also been lower particularly in the manufacturing sector due to uncertainties about the demand and income-growth in the economy. However these have picked up during 1994-95.

The import substitution policy which was followed to save on imports might have indirectly caused more imports (in the long run) at the over-all level in the economy. Besides due to low share in the world trade, the terms of trade were generally against the developing countries. Further as a result of shift in the major traded commodities over the years, the terms of trade moved farther against the agricultural goods compared to the industrial goods. In spite of rapid growth in scientific and technological education and research, the brain-drain continued from India, owing to lack of comparative environment, which resulted in continued technology-gap between India and the industrialised world.

1.2.2 Structure of the Indian Economy

Besides the rate of growth of production, it is important to see the structure of production over the years. It is generally found in accordance with the stages of development theory, that the share of manufacturing sector in the total value added in the economy should grow and that of agriculture sector should come down gradually with the level of development. In the advance stage, the share of the tertiary sector or services should

become high compared to those of secondary and primary sectors. Let us examine the structure of the Indian economy in the next paragraphs.

Table 1.2 : Structure of the Indian Economy Over the Years

Item	\	Year	1980-81	84-85	89-90	91-92	92-93	93-94	94-95
(i) Share of the various sectors of the economy in Percentage									
1. Primary Sector		38.1	34.5	31.3	32.2	32.3	31.7	31.3	
2. Secondary Sector		25.9	27.7	29.1	27.9	26.9	27.0	27.5	
3. Tertiary Sector		36.0	37.8	39.6	39.9	40.2	41.3	41.2	
(ii) The Indices of the various sectors of the economy									
1. Agricultural Production (1981-82 = 100)		102.1	116.7	143.0	145.9	151.5	158.9	164.1	
2. Industrial Production (1980-81 = 100)		100.0	130.7	196.4	213.9	218.9	232.0	251.9	
3. Quantum Index of Exports (1978-79 = 100)		108.1	120.8	174.9	208.6	222.9	257.5	292.7	
4. Quantum Index of Imports (1978-79 = 100)		137.9	156.1	227.8	228.0	282.0	329.1	532.5	

Source Economic Survey, National Accounts Statistics (NAS)

Central Statistical Organisation (C.S.O.), Various issues

From Table 1.2, we observe that though the share of primary sector has gone down in the economy from about 38% in 1980-81 to about 31% during 1989-90, the share of manufacturing sector has gone up from about 26% to 29% only. Further after the industrial and trade policy reforms, these shares are showing opposite trends in growth in the recent period till 1993-94. The share of tertiary sector is growing steadily though slowly. The agricultural production is growing slowly and after 1991, subsequent to initial stagnation in both agricultural and industrial

production there has been significant growth. The increase in quantum of imports has been faster than that of exports. This trend has fluctuated after the liberalisation of foreign trade during 1991. In Table 1.2 above, the structure of the Indian economy over the years has been presented.

**Table 1.3 : Growth Rates of Macro-economic Aggregates
over the Years**

Year	Annual Growth in Macro-economic Aggregate (%)		
	Gross Domestic Product	Per Capita Income	Population
1950-51	2.5	0.7	1.7
1955-56	2.8	0.7	1.8
1960-61	2.0	(-) 0.2	1.9
1965-66	(-) 3.8	(-) 6.8	2.3
1970-71	5.1	2.8	2.3
1975-76	9.2	7.0	2.4
1980-81	7.3	5.2	2.3
1985-86	4.1	1.7	2.2
1989-90	5.6	3.3	2.1
1990-91	5.2	3.0	2.1
1991-92	1.4	(-) 1.1	2.0
1992-93	4.0	2.3	2.0
1993-94	5.0	2.3	1.8
1994-95	6.3	4.8	1.8

Cummulative Average Rate of Growth over the decades-

From 1950-51			
to 1960-61	3.9	1.8	1.9
From 1960-61			
to 1970-71	3.7	1.2	2.2
From 1970-71			
to 1980-81	3.1	0.7	2.3
From 1980-81			
to 1990-91	5.5	3.0	2.1

Source Basic Statistical Returns to the Indian Economy (BSR), All India Vol.I Centre for Monitoring the Indian Economy (C.M.I.E.), 1993.

From Table 1.3 it is evident that Indian population continues to grow at a fast rate of around 2.0 per cent per annum. So the long-run average rate of growth in per capita income has been very low (at about 1-1.5 % per annum) till the late seventies. However during the eighties the growth was faster, but after the reforms, it has again slipped back to earlier range before making significant recovery during 1994-95.

From Table 1.3 we observe the annual growth rates of gross domestic product, per capita income and population to give an idea of the long-term development situation in the Indian economy.

**Table 1.4: Sectoral Growth Rates of Gross Domestic Product
(at 1980-81 prices in %)**

Year \ Sector	Primary	Secondary	Tertiary	Total
1950-51	1.5	4.7	2.6	2.3
1955-56	(-) 0.9	9.7	5.1	2.6
1960-61	6.7	10.2	5.6	7.1
1965-66	(-) 11.0	3.1	2.7	(-) 3.7
1970-71	7.1	1.4	4.9	5.0
1975-76	12.9	5.5	6.8	9.0
1980-81	12.9	3.5	4.2	7.2
1985-86	0.3	4.6	7.4	4.1
1989-90	1.7	7.2	7.8	5.6
1990-91	4.8	6.9	4.2	5.2
1991-92	(-) 2.0	(-) 1.7	4.9	0.8
1992-93	5.8	4.4	5.1	5.1
1993-94	3.3	4.2	6.8	4.9
1994-95	4.9	8.6	6.0	6.3

Cummulative Average Rate of Growth over the decades-

From 1950-51 to 1960-61	3.0	6.2	4.1	3.9
From 1960-61 to 1970-71	2.3	5.4	4.6	3.7
From 1970-71 to 1980-81	1.5	4.0	4.3	3.1
From 1980-81 to 1990-91	3.6	7.0	6.3	5.5

When we peruse the sectoral growth rates from Table 1.4, we observe that the secondary sector has grown faster in terms of value added compared to the primary and tertiary sectors. But after the reforms, the performance of primary sector (particularly the agriculture sector) and that of manufacturing sector has been unsatisfactory. The tertiary sector has grown albeit at a slower rate than before. Whether these trends are of transitory nature or of permanent form is to be seen in the future. But the way the demand of capital goods went down during early post-reform period (including those of imported capital goods), as depicted by the decline in rate of fixed capital formation in the recent years, the doubts seem to be relatively serious.

1.2.3 Investment

The parameter of long term growth in the economy is the growth in capital formation. As we observe in Table 1.5, the gross domestic capital formation has been growing steadily over the years. Another aspect of its growth has been relatively more investment with the help of indigenous machinery and equipment over the years. From over 50 per cent imported machinery in 1950-51, the share of imported machinery used in fixed investment has come down to about 15 per cent during the late seventies. After gradual liberalisation of trade its share is again going up slowly. The trends of 1991-92 are not representative as there was pro-rata cut in imports irrespective of their use and also there was recession in the industry. With more easy access to foreign products, at less differential cost and with better technology there is fear that capital formation may come down in future. It has been already seen that the imports of

Capital goods came down relatively during 1992-93, while those of consumer goods have increased. The fixed capital formation generally suffered during the years 1991-92 and 1992-93 but it has picked up during the later years. The trend in the share of indigenous machinery also changed during 1991-92 to 1993-94 but it has regained its earlier level during 1994-95.

Table 1.5: Gross Domestic Capital Formation by Type of Assets
 (at current prices in Rs.Million)

Year	Construction	Machinery		Change in Stocks	Total
		Imported	Indigenous		
1950-51	6330	1320	1090 (45.23)	1600	10340
1955-56	8100	1940	2790 (58.98)	1330	14160
1960-61	13370	3560	4630 (56.53)	4270	25830
1965-66	23600	4920	12800 (72.23)	2950	44270
1970-71	39600	4040	19410 (82.77)	10740	73790
1975-76	73400	8820	51080 (85.27)	30760	164060
1980-81	136490	19100	107170 (84.87)	21770	284530
1985-86	274530	42850	225170 (84.01)	83660	626210
1989-90	485910	88310	460800 (83.92)	155790	1190810
1990-91	557320	104150	564260 (84.42)	179430	1405160
1991-92	659340	100060	601450 (85.74)	103350	1464200
1992-93	734030	108390	576310 (84.17)	125780	1544510
1993-94	821150	166630	757900 (81.98) (-)123700		1733310
1994-95	970250	199900	1155390 (85.25)	58560	2384100
<hr/>					
CARG (1950-51 to 1990-91)	11.8	11.5	16.9	12.5	13.1

CARG- Cummulative Average Rate of Growth.
 Figures in brackets give per cent share of indigenous Machinery out of total value of machinery installed in India.
 Source:-BSR, C.M.I.E., various issues.

If we look at the scenario of capital formation in various industries (activities), we observe that the share of capital formation in agriculture ,manufacturing sectors has come down rapidly since 1980-81.Although the share of agriculture in

Table 1.6: Gross Capital Formation by Industry of Use

(at 1980-81 prices per centage distribution)

\Year Activity\	1960-61	80-81	90-91	91-92	92-93	93-94	94-95
Agriculture	15.1	19.8	10.5	12.1	10.3	11.8	10.8
Mining & Quarrying	1.6	3.0	5.8	6.0	4.5	3.8	8.1
Manufacturing	28.2	28.5	26.8	23.9	24.0	24.2	27.2
(a) Registered	25.6	21.8	19.7	17.4	17.2	17.7	19.6
(b) Un-Regd.	2.7	6.7	7.1	6.5	6.8	6.5	7.6
Electricity, Gas & Water Supply	4.3	10.5	12.1	13.4	12.8	13.5	11.7
Construction	3.9	2.3	2.5	2.7	1.6	1.9	1.6
Trade , Hotels & Restaurants	6.0	5.9	10.5	4.1	12.0	6.6	6.0
Transport, Storage & Communication	12.7	9.5	12.3	14.4	13.6	15.3	13.6
Finance, Insurance Real Estate and Business Services	14.2	11.0	11.4	14.1	13.5	15.3	13.5
Community, Social & Personal Services	13.9	8.9	8.1	9.3	7.7	7.6	7.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source:- National Accounts Statistics (NAS),Central Statistical Organisation (C.S.O.),Ministry of Planning, Govt.of India, various issues.

capital formation has slightly increased during 1991-92, it seems to be due to the higher activity of exports of agro-based goods. It is yet to be observed whether this trend is stable or not. We observe from Table 1.6 that the share of manufacturing sector in capital formation has come down since 1980-81 very substantially. Since the manufacturing sector is the vehicle of growth, it has been disappointing. It has been particularly so in the organised manufacturing sector; while in the small scale unregistered sector, the trend is positive, except during 1991-92 (after the major liberalisation of industrial and trade policies). While it is good that the basic infrastructure sectors like electricity,

construction, transport and communication and finance sectors are attracting higher investment, it is the manufacturing sector which should grow faster at the present stage of industrialisation in this country. It is however heartening to note that the capital formation in manufacturing sector in organised as well as unorganised segments has gone up during 1994-95 very significantly.

1.2.4 Consumption

The internal demand is very important for any country to develop faster to provide economies of scale to domestic producers of various goods and services. Let us now view the shares of major items of final consumption over the years. These data are presented in Table 1.7. From this table ,we observe that the share of primary food items i.e. cereals & bread and pulses has come down over the years from about 25 per cent to about 15 per cent , while that of oils, fruits & vegetables, milk & milk products, eggs, fish and meat has increased from about 18 per cent during 1960-61 to about 26 per cent in 1990-91 to come down again to about 24% during 1994-95. Similarly, the shares of clothing ,medical care, education and specially transport and communication services have increased. Thus we observe that the consumption pattern has been shifting from low price elasticity goods to higher elastic goods as well as to more manufactured goods and services from primary basic goods. So the Indian economy is now in a position to provide market for more varied types of production activities in agriculture as well as in industry.

Table 1.7 : Shares of Major Items of Private Final Consumption
Expenditure (per centage distribution)

Item \ Period	1960-61	80-81	90-91	91-92	92-93	93-94	94-95
Food	52.6	53.4	49.0	50.4	48.7	48.4	47.8
Cereals, Bread	24.8	20.3	14.3	15.9	16.7	16.0	15.5
Pulses	2.6	2.8	2.6	2.1	2.0	2.0	1.9
Sugars	4.4	5.2	4.2	3.9	5.6	4.9	5.1
Oils	3.5	4.7	5.0	5.0	4.5	4.8	4.6
Fruits & Veg.	5.0	6.9	7.4	8.0	6.1	6.5	6.5
Milk & Products	7.0	7.6	9.3	9.5	8.2	8.2	8.0
Meat, Eggs & Fish	2.5	2.7	3.8	3.8	3.2	3.5	3.7
Coffee & Tea etc.	2.7	3.2	2.4	2.1	2.3	2.5	2.5
Beverages	2.9	1.9	1.6	1.7	1.6	1.6	1.5
Tobacco	4.2	2.5	2.2	2.0	1.6	1.6	1.5
Hotels & Rest.	0.7	0.9	1.0	1.0	1.1	1.1	1.2
Clothing	7.9	10.3	9.7	9.1	9.9	10.6	10.9
Footwear	1.0	0.9	1.0	0.9	0.7	0.6	0.6
Rent & Water	14.7	7.9	6.4	5.8	7.3	7.1	7.0
Fuel & Power	3.5	4.6	4.3	4.0	4.7	4.5	4.5
Furniture & Eqpt.	1.4	2.4	3.0	2.8	3.0	2.8	3.1
Dom. Services	0.9	0.4	0.4	0.4	0.4	0.3	0.3
Medical care	1.5	3.0	2.5	2.3	2.4	2.3	2.2
Transport & Commn.	2.9	5.1	10.6	11.5	9.8	9.8	10.2
Recreation, Ed. etc.	2.5	3.0	3.8	3.8	3.8	3.8	3.9
Miscellaneous	3.3	3.5	4.4	4.3	5.1	5.3	5.2

Source:- BSR, All India, Vol.I , C.M.I.E., various issues.

The size of urban middle class and rural rich peasantry has grown in India over the years, so there is significant market for more agro-based manufactured products like sugar, confectionery products, beverages, milk products, processed fruits and vegetables etc. This provides large scope for agro-based industrialisation specially in the rural areas and that too without much sophisticated technology.

It is evident from the above data that the decade of eighties has shown a clear departure from the previous trend. The eighties have been the period with mild liberalisation in foreign trade as well as of reduction in direct tax rates

rationalisation of income tax and corporate taxes). During this period a general shift away from socialistic pattern has been visible in the political economy of India because of growth of the size of the middle influential class.

1.2.5 Foreign Trade

So far we have observed the structure of the Indian economy in general. Now let us discuss the importance of foreign trade particularly the imports in the Indian economy over the years. Some of the items have been traditionally imported in India and such imports have been basic inputs in agriculture and industry e.g. fertilisers, crude oil and Plant & Machinery. As these items either require mineral resources which are nature's gift or produced in large plants with modern capital intensive technology, production of such items can not be expected to meet the indigenous requirement only with domestic resources at least in the short run. However, there has been a change in the situation over the years.

Now we shall view the trend of imports of major items viz., fertilisers, crude and petroleum products. Table 1.8 presents the total production, imports and consumption of fertilisers over the years.

From the Table 1.8 we observe that the production of fertilisers has gone up very fast particularly during the green revolution period of early sixties. Similarly the consumption of fertilisers has also gone up at similar rate over the decades. The share of imports of fertilisers, which was over 50 %

Table 1.8 : Production ,Imports and Consumption of Fertilisers
in India (in thousand tonnes of nutrients)

Year	Production	Imports	Consumption	
			Total	Kgs.per Hectare
1951-52	27	52 (78.8)	66	0.6
55-56	89	63 (48.1)	131	0.9
60-61	166	419 (142.5)	294	1.9
65-66	357	413 (52.6)	785	5.1
70-71	1061	630 (27.9)	2256	13.6
75-76	1828	1635 (56.5)	2894	16.9
80-81	3005	2759 (50.0)	5516	31.5
85-86	5756	3399 (40.1)	8474	47.4
89-90	8543	3114 (26.9)	11568	65.4
90-91	9044	2758 (22.0)	12546	70.0
91-92	9863	2769 (21.7)	12728	69.7
92-93	9736	2988 (23.5)	12152	69.4
93-94	9047	3166 (25.9)	12366	N.A.
94-95	10438	2965 (22.1)	13564	N.A.
<hr/>				
CARG from 1951-52 to 1964-65	22.4	14.5	20.8	17.5
From 1969-70 to 1980-81	11.0	10.9	9.8	9.0
From 1980-81 to 1990-91	11.6	0.0	8.6	8.3

Source BSR, All India, Vol.I, C M I E (1993), CARG-Cummulative Average Rate of Growth.Figures in brackets show the proportion of import out of the total consumption in per cent.

prior to eighties, has come down to about 22 % out of the total consumption. It has been made possible by protection of domestic fertiliser industry with the help of subsidies. Still to contain the level of subsidies and for steady growth in use of fertilisers in agriculture, the imports are necessary. As is evident, during the eighties, there has been no growth or decline in imports of fertilisers as a proportion of total consumption. During 1992-93, some initiative was taken to bring down the subsidy on fertilisers, but it resulted in lower fertiliser use in agricult-

ture and consequently to low domestic production in agriculture. So more imports had to be provided, which underscores the importance of imports in this basic input. Therefore, it is not fair to treat such imports as leakages to the domestic economy or undesirable to the domestic production. It nevertheless underscores the necessity of improving the domestic production of indigenous fertilizers.

Table 1.9 : Commodity-Balance of Petroleum and Petroleum Products
(in million tonnes)

Year	Crude Petroleum			Petroleum Products		
	Refinery Throughput	Domestic Production	Imports	Domestic Prodn.	Consumption	Imports
1950-51	0.3	0.3	N.A.	0.2	3.3	3.1(93.9)
60-61	6.6	0.5	6.0(90.9)	5.7	7.7	2.5(43.9)
70-71	18.4	6.8	11.7(63.6)	17.1	17.9	0.8(4.7)
80-81	25.8	10.5	16.2 (62.8)	24.1	30.9	7.3(30.3)
85-86	42.9	30.2	14.6(34.0)	39.9	40.9	1.9(4.8)
89-90	51.9	34.1	19.5(37.6)	48.7	54.1	4.0(8.2)
90-91	51.8	33.0	20.7(40.4)	48.6	55.0	6.0(12.3)
91-92	51.4	30.4	24.0(46.7)	48.3	57.0	6.5(13.5)
92-93	53.5	27.1	29.2(54.6)	50.4	58.9	7.6(15.1)
93-94	54.0	27.0	30.8(57.0)	51.1	60.8	8.1(13.7)
94-95	56.1	32.7	27.3(48.6)	52.9	65.5	10.7(16.8)

Source BSR, All India, Vol.I, C M I E (1993)

Figures in brackets are the proportion of imports in per cent of total refinery th'put and total domestic consumption respectively

When we look at the position of production, consumption and imports of Crude Petroleum and Petroleum Products, we observe that the domestic production of Crude increased at a fast pace in early eighties. It helped to bring down dependence on Crude imports to about one-third of the total requirement in mid-eighties. But subsequently, the domestic production has slowly come down and the imports have again shot

up to over one-half of the domestic requirement. It can be observed from Table 1.9 .

Further from Table 1.9 we observe that as a result of mechanisation of agriculture and increasing energy intensity of the industry in general (Hashim and Satyanarayana, 1992), the consumption of petroleum products is going up at a fast pace. As a result the imports of petroleum products have also gone up steadily since the late eighties, when it was marginal. Depending upon the nature of these products, it seems implausible that the imports in this sector can be avoided without its negative effect on domestic production in future. Therefore, we can say that the imports will be necessary as well as desirable in petroleum sector for growth in the economy with the present state of technology.

1.2.6 Balance of Payment

Let us now discuss the cause of economic crisis in late 1990 and early 1991 in India. As already stated in earlier paragraphs, the real cause of this crisis was not the trade-gap but the negative balance on invisibles' account due to decline in private transfers from abroad. Still, the trade-gap has been negative almost throughout the history of independent India except for two years (with marginal surplus). As we can observe from Table 1.10 below , the trade-balance was negative in the early period, but it was well within control till late seventies. Starting from 1980-81, it started jumping to unprecedented heights to over \$ 7 billion with mild phase of liberalisation of foreign trade and removing some of the controls on large and foreign companies (Please see Appendix-II).

Table 1.10 : Trade -Balance over the Years
 (in million \$ and Rs. million)

Year	Exports		Imports		Trade-Balance	
	US \$ (M.)	Rs. M.	US \$ (M.)	Rs.M.	US \$ (M.)	Rs.M.
1949-50	1016	4850	1292	6170	(-) 276	(-) 1320
55-56	1275	6090	1620	7740	(-) 345	(-) 1650
60-61	1346	6420	2353	11220	(-) 1007	(-) 4800
65-66	1693	8100	2944	14090	(-) 1251	(-) 5990
70-71	2031	15350	2162	16340	(-) 131	(-) 990
75-76	4665	40360	6084	52650	(-) 1420	(-) 12290
80-81	8486	67110	15869	125490	(-) 7383	(-) 58380
85-86	8904	108950	16067	196580	(-) 7162	(-) 87630
89-90	16612	276580	21219	353280	(-) 4607	(-) 76700
90-91	18143	325530	24075	431980	(-) 5932	(-) 106450
91-92	17865	440410	19411	478510	(-) 1546	(-) 38100
92-93	18537	536880	21882	633750	(-) 3345	(-) 96870
93-94	22238	697510	23306	731010	(-) 1068	(-) 33500
94-95	26300	826740	28654	899720	(-) 2324	(-) 72970

Source BSR, All India, Vol.I, C M I E (1993)
 M. = Million

Further we observe that the growth of imports in Dollars (\$) terms has been faster compared to that of exports till mid-eighties. So it is wrong to infer that the crisis was due to trade gap alone, of course it was negative and growing but, the same was much less than that during early eighties. During 1991, after the reforms in the field of industrial as well as trade policies, the recession took grip of the economy and with cuts on imports, trade balance came down during 1991-92, but increased again in 1992-93.

But during 1993-94 with low capital imports in spite of cheaper rate on account of less custom duties, the imports have not gone up, while with less demand from domestic industry and advantage due to devaluation of Rupee, the exports have picked up during 1993-94, resulting in low trade-balance. As such it is not possible to predict, without detailed analysis about the future course on trade front. There are indications that the

trade balance is further likely to grow during 1995-96.

Table 1.11 : Balance of Payment-Invisibles on Current Account

\ Year Item\	1960-61	70-71	80-81	89-90	90-91	91-92	92-93
in U.S.Dollars (\$) Million							
Foreign Travel	3	19	874	1716	1910	3780	4883
Transportation	20	30	6	-346	-196	-882	-1697
Insurance	2	..	17	58	40	-42	11
Invest.income	-48	-254	257	-4875	-6732	-9397	-10503
Govt.NEI	30	7	41	-159	-284	-251	-85
Miscellaneous	2	-47	88	-64	289	527	-414
Transfer Payments							
(a) Private	28	88	2125	3798	3711	9381	8089
(b) Official	45	122	592	897	828	1140	1053
Total(in US \$ M.)	83	-37	3997	1025	-435	4258	1337
in Rs. Ten Million							
Foreign Travel	6	25	1107	1031	1064	1512	1713
Transportation	42	40	8	-298	-110	-350	-503
Insurance	4	..	22	-35	23	-18	11
Invest.income	-101	-339	326	-2928	-3752	-3830	-3423
Govt.NEI	63	9	51	-96	-158	-103	-26
Miscellaneous	4	-63	111	-38	161	165	-68
Transfer Payments							
(a) Private	59	117	2692	2281	2069	3783	2774
(b) Official	95	163	750	539	461	460	364
Total(Rs.Ten M.)	174	-49	5063	616	-242	1620	842

Source Economic Survey, 1993-94.

If we look on the figures of balance of payment on invisibles'account, it becomes clear why there was a crisis during 1990-91. From Table 1.11 , it is evident that India had surplus balance although on this account except for a few years. It may be noted here that during the early eighties, these surpluses increased at a fast pace, due to which the trade gap was not taken seriously. And consequently no serious attempt was made to correct the balance of payment position in early-eighties. When during 1989-90 and especially in 1990-91, due to

political uncertainty at home and resultant decline in investment income and less remittances from non-resident Indians abroad, the balance on invisibles' account went down and became negative during 1990-91, as such the crisis situation was faced during 1991.

As can be observed from Table 1.11 above, that there has been negative balance in investment income in India over the years particularly in the recent past. It is further increasing after reforms, as such adversely affecting the balance on invisibles' account. It is therefore necessary to plan carefully on a long-term basis depending upon a detailed study, for containing trade-balance without having serious effects on domestic production, growth and income.

1.3 Structure of Foreign Trade

Let us now have a view of the structure of foreign trade of India over the years. For studying the broad structure of exports we have a perusal of Table 1.12 .

From Table 1.12 we observe that the exports have been moving more towards manufactured goods from primary goods in the early period. We observe that the share of agricultural products has gone down regularly over the years in our exports. Although in the later years after reforms this trend seems to be halting and in future agri-products' exports may go up. Similarly dependence of exports on ores and minerals has also gradually come down. Currently about three fourths of our exports consist of

Table 1.12 : Share of Major Items of Exports Over the Years

\ Year Item\	(in percentages)						
	1980-81	84-85	89-90	91-92	92-93	93-94	94-95
1. Agri. and allied Prod.	30.7	25.5	18.2	18.7	17.6	18.7	16.6
2. Ores & Minerals	6.2	5.4	5.0	4.6	3.4	3.4	3.1
3. Manufactured Goods	55.8	52.9	74.1	74.2	76.1	75.6	78.2
4. Mineral Fuels & Lubricants	0.4	15.5	2.6	2.4	2.8	2.2	1.9
5. Others	6.9	0.7	0.1	0.2	0.1	0.1	0.2

Source BSR, All India, Vol.I, C.M.I.E., 1993

manufactured goods of various types from textiles to gems and jewellery, leather products, machinery etc. This trend of growth of exports of manufactured goods is good for the growth of economy because of excess capacity and for increasing economies of scale in manufacturing in the time of horizontal diversification of products and intra-industry specialisation in trade.

On the same pattern when we look at the structure of India's imports over the years from Table 1.13, we observe that the share of consumer goods in imports has come down over the years, which shows the wide range of products being manufactured in India. While during the early period consumer goods constituted over 20% of total imports, these became marginal during 1990-91. After reforms, however, due to growth in foreign investment in India and cheaper and easier imports of more diversified products, the share of consumer goods in imports is tending to grow, which does not seem to be good for growth of domestic economy in India at the present stage of development.

Further we find that the share of raw materials and intermediate goods in imports had been growing steadily, indicating vast scope for further value addition in the Indian economy. This is a good trend, but it is premature to predict for future without a detailed study in this area. But when we look at the share of capital goods we find that while during the early years large imports were necessary for development of large plants of electricity, multi-purpose irrigation projects, steel etc. Therefore the share of capital goods in imports was quite high, which gradually came down in seventies. However, it has been going up since early eighties. But after reforms, the share of capital goods was again going down initially, which might have affected the rate of capital formation in fast globalising economy of India. However, it is heartening to note that both the shares of raw materials and capital goods have gone up to the previous rates during the year 1994-95.

Table 1.13 : Share of Major Items of Imports Over the Years
 (in Percentages)

Item\Year	1980-81	84-85	89-90	91-92	92-93	93-94	94-95
1.Consumer Goods	3.0	4.0	1.1	0.4	1.5	0.4	Neg.
2.Raw Materails & Inter.goods	77.8	75.3	74.0	77.8	77.8	76.8	77.8
3.Capital Goods	15.2	18.5	24.9	21.8	20.7	22.8	22.2
4.Others	4.0	2.2	..	..	..	..	..

Source BSR, All India, Vol.I, C.M.I.E., 1993.

Based on this scenario we can state that a detailed study is necessary to help the economy grow fast in future in

field of international trade , so that desirable imports may be segregated from those which are not desirable for the domestic economy.During the reforms process, there has been general reduction in import duties and removal of export subsidies without equivalent reduction in excise duties.There may be direct, indirect and induced effects of such changes in policies on various sectors in the economy, which need to be studied in detail in a disaggregated model.

Now let us study the the share of imports with a view of the use of the same in the economy.We observe from Table 1.14 that over the years, more and more imports are being used for private consumption.

Table 1.14 : Distribution of Imports by Various Uses over the Years (in percentages)

Category of Use	During the year				
	1979-80	1984-85	1989-90	1991-92	1996-97
1. Intermediate Consumption	72.56	49.75	49.80	48.86	42.24
2. Private Consumption	15.05	17.16	23.42	24.94	30.88
3. Government Consumption	02.34	19.87	2.73	3.85	2.82
4. Fixed Capital Formation	10.05	14.22	24.05	22.35	24.06
Total	100.00	100.00	100.00	100.00	100.00

Source : Planning Commission, I-O tables used in this study.

When we look at the share of imports from the point of view of use, we observe that over the years, more and more imports are being used for private consumption and Govt. consumption, which are non-productive in nature. But the share of imports used as intermediate inputs has come down, which is not

good for growth of domestic industry. Although the share of imports used for capital formation has increased. So it is all the more important to be selective while liberalising imports. There is a case for dividing imports into competitive and complementary segments based on their necessity for domestic production.

Now we shall have a view of foreign trade of India in various important items. These are presented in Tables 1.15, 1.16. From Table 1.15 ,we observe that there has been high growth in exports of agricultural products in the later years,e.g. tea, rice, marine products and chemicals particularly in the last two years. Out of the manufactured goods, the exports of leather goods, cotton fabrics have increased after devaluation of Rupee in 1991. It may be noted that the most important item of export currently happens to be gems & jewellery, which needs larger share of imports in the form of raw jewels, gold and diamonds etc. In capital goods also the exports have increased in the later years including machinery and transport equipments. It shows that with the current exchange rate, the Indian goods are becoming competitive in the world market.

When we observe the item-wise data on imports over the years, we find that the imports of food items had decreased till late eighties, but after the reforms, the food items' imports have again increased. We also observe that the imports of raw materials, oils and petroleum products, chemicals have all increased at a very fast rate during the eighties compared to previous years. Further the imports of manufactured

Table 1.15 : Exports of Principal Products from India
 Over the Years
 (in Rs. Ten Million)

Comm-\ odity	\Year 1970-71	80-81	84-85	90-91	91-92	92-93	93-94	94-95
1. Agri. Prod.	494	2056	2996	6317	7878	9457	13021	13712
Cashew	57	140	180	447	676	749	1048	1247
Coffee	25	214	210	252	332	376	546	1053
Tea	148	426	137	1070	1212	977	1059	975
Spices	54	149	207	239	394	393	569	612
Rice	5	224	169	462	756	976	1287	1206
Fish	31	217	381	960	1443	1743	2552	3537
Raw Tobbaco	55	141	178	263	377	474	461	255
Raw Cotton	14	165	60	846	306	182	654	140
2. Ores &								
Minerals	164	414	638	1497	2030	1814	2371	2538
Iron Ore	117	303	459	1049	1435	1104	1374	1297
3. Min. Fuel	13	28	1823	948	1041	1520	1554	1610
4. Chemicals	36	225	483	2111	4145	3991	5688	7642
5. Mfd. Prod.	588	2134	6210	23736	32693	40835	52702	64683
Leather based prod.	99	390	724	2600	4289	3700	4077	5057
Cotton fabrics	98	408	620	2100	3203	3911	4821	7014
Jute prod.	190	330	341	298	391	355	389	473
Iron & Steel	91	70	N.A.	N.A.	379	449	N.A.	N.A.
6. Gems & Jewellery	45	618	1237	5247	6750	8896	12533	14131
7 Capital goods	111	712	956	3872	4663	7118	9484	10947
Metal Mfg.	28	186	N.A.	N.A.	1194	1696	N.A.	N.A.
Machinery	45	329	N.A.	N.A.	2245	2342	N.A.	N.A.
Tpt. Eqpts.	38	196	N.A.	N.A.	1224	1519	N.A.	N.A.
8 Others	129	1122	N.A.	55	51	62	103	126
9 Total	1535	6711	11743	32553	44042	53688	69751	82674

Source Special Statistics-5, EPW Research Foundation, 1993, Bombay
 and Economic Survey, 1995-96.

Table 1.16 : Imports of Principal Items Over the Years
 (in Rs. Ten Million)

\Years Item\	1970-71	80-81	84-85	90-91	91-92	92-93	93-94	94-95
1.Food	242	380	695	N.A.	804	1843	N.A.	N.A.
-----	---	---	---	---	---	---	---	---
Wheat	173	77	129	N.A.	..	698	N.A.	N.A.
Pulses	..	30	101	473	255	316	N.A.	N.A.
Cereal Pr.	213	100	242	151	173	966	290	9
2.Crude Mat.	200	565	1123	N.A.	4607	6147	N.A.	N.A.
-----	---	---	---	---	---	---	---	---
3.Oil & POL	136	5264	5409	10816	13123	17142	18046	18613
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4.Animal & Veg.Oils	39	709	1008	322	249	174	167	624
-----	--	---	---	--	--	--	--	--
5.Chemicals	217	1325	2771	5786	7726	8862	N.A.	N.A.
-----	---	---	---	---	---	---	---	---
Org.& Inorg.	68	158	857	N.A.	1397	4134	4823	7344
Drugs & Ph.	24	85	137	468	558	813	804	937
Fert.	86	818	1346	1766	1591	2632	2591	3304
6.Mfd.Prod.	345	2153	2970	N.A.	8439	11361	N.A.	N.A.
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Non-Met. Min.	33	555	1114	N.A.	5043	7260	N.A.	N.A.
Pearls etc.	25	417	1032	3738	4825	7072	8263	5116
Paper & Pro.	25	187	196	456	488	482	696	773
Iron &	147	852	941	2113	1741	2254	2494	3653
Steel								
Non-Fer. Metal	119	477	412	1102	839	1144	1503	2954
7.Capital Goods	404	1910	23168	10466	10436	10839	16663	19990
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Non-Elec.	258	1089	1928	4240	4019	4788	6388	9236
Machinery								
Elect.Mach	70	260	730	1702	1552	588	640	789
Tpt.Eqpts.	67	472	360	1670	915	1336	3965	3497
8.Others	76	243	376	N.A.	N.A.	N.A.	N.A.	N.A.
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Total	1634	12549	17134	43198	47851	63375	73101	89971

Source Special Statistics-5,EPW Research Foundation,1993,Bombay
 and Economic Survey,1995-96.

goods particularly of gems & raw pearls, precious stones which are used for manufacture of exportables have increased.Besides these, the imports of other manufactured goods have not increased

fast. The imports of capital goods particularly electrical and electronic machinery goods have increased many-fold during the last decade till 1991-92. However, imports of transport equipments have not increased much due to many foreign tie-ups in domestic automobile industry. Thus we can infer that the growth of imports has been fast specially since the liberalisation of foreign trade in early eighties (mid-eighties in particular). So for the growing trade-gap, we may intuitively infer that the liberalisation of industry and trade is particularly responsible. It may be due to increasing import-intensity of domestic manufacturing not coupled with equivalent export intensity of the domestic manufacturing sector.

Now let us see the import intensity of the exported goods produced by various sectors in the Indian economy. Table 1.17 gives these data, which show that the import intensity of exported goods has increased at a fast rate during the eighties. The study of EXIM bank and of Planning Commission (Hashim & Satyanarayana) clearly indicate that the import intensity of indigenous production has increased. It is evident from Table 1.17 (b) that the import intensity of large scale manufacturing sectors like chemicals and engineering goods is quite high, though the highest import intensive item in the Indian exports happens to be the gems & jewellery. Thus we find that for attracting the industries to export, more and more imports are being added and with low exchange value of Rupee, the foreign trade is becoming less and less profitable in terms of net gain.

Table 1.17 : (a) Trends in Import Intensity of Exports During the Eighties

Characteristic \	Value in Rs. Ten Million for					
	Year					
	1980-81	85-86	86-87	87-88	88-89	89-90
1. Total Exports	6,711	10,895	12,452	15,674	20,295	27,681
2. Total Mfd. Goods	3,747	6,374	7,808	10,865	14,641	20,310
3. Total Mfd. goods Excl. Gems & Je'ry	3,129	4,871	5,734	8,248	10,242	15,014
4. Import Licenses to Exporters/EPS's	1,422	2,849	3,553	4,952	8,469	10,535
5. Imports of Pearl & Precious Stones	417	1,100	1,489	2,018	3,175	4,242
6. Imports of Others	1,005	1,749	2,064	2,934	5,294	6,293
Indices of Import Intensity of Exports						
(4)/(1) %	21.2	26.1	28.5	31.6	41.7	38.1
(4)/(2) %	38.0	44.7	45.5	45.6	57.8	51.9
(6)/(3) %	32.1	35.9	36.0	35.6	51.7	41.9

Table 1.17 (b) Import Intensity of Major Export Items

Item	Import Intensity (%)
Gems & Jewellery	78
Leather & Products	05
Readymade Garments	05
Chemicals & Drugs	31
Engineering Goods	28
Over-all Import Intensity	38

Source Export and Import Bank of India, Occassional Paper No.16
1991.

If we look at the share of India's exports out of the world's exports ,we observe from Table 1.18 below that at overall level India's share has come down from over 1.00 per cent

increasing but it is still about 0.6 % of the world's exports.

Table 1.18 : Share of India's Exports in the World
for Major Items

(in percentages in US \$)

Item	Year	1970	1980	1990	1991	1992
Rice		0.65	3.70	6.50	7.60	3.40
Tea & Mate		33.40	27.70	22.00	18.60	10.50
Spices		20.50	14.50	7.90	8.70	64.10
Tobacco (Raw)		4.00	4.40	0.80	2.20	0.40
Iron Ore		6.70	6.30	7.30	5.90	9.40
Leather Mfg.		9.10	6.80	6.30	4.70	4.00
Textiles		4.10	2.30	2.10	2.00	2.00
Pearls, Pre. Stones		2.20	3.10	9.00	7.80	10.10
Readymade Garments		...	1.80	2.40	2.10	2.40
Total Exports		0.60	0.40	0.60	0.50	0.60

Source BSR, All India, Vol.I, C.M.I.E., 1993, Economic Survey, 1995-96.

If we look at the share of India's exports out of the world's exports ,we observe from table 1.18 that at overall level India's share has come down from over 1.00 per cent during 1950 to about 0.4 per cent in 1980. Since then it is slowly increasing but it is still about 0.6 % of the world's exports.

We observe from Table 1.18 that in respective items, India's share has increased in rice,pearls and gems & jewellery, which are household sector products.Also in case of readymade garments, the share of India has increased. But in most of the traditional goods e.g. tea,spices,tobacco, iron ore, leather goods and textiles,India's share has gone down. So we find that though India's exports in value terms have increased in these items over the years, as a proportion of world trade ,however

India is a tiny player. It also reflects from the above data on trade shares that by mere devaluing the domestic currency, India's share in the world exports may not increase.

Another important aspect for the growth of foreign trade is the unit value indices. From Table 1.19 we observe that unit value index of exports grew slowly compared to that of imports till 1982-83, but later, it has grown faster, which means that imports are becoming comparatively costlier than exports in terms of real value. This gap has widened very fast in the later years. So even if in Rupee terms the exports may increase faster the net growth in Dollar (\$) terms is quite slow. Similarly, when we study the terms of trade, we find that the gross terms of trade have increased during many years, although in later years, the same have fallen. In case of income terms of trade, also there has been fast increase, particularly in the early nineties. It is also due to depreciation of Rupee at a faster rate, as it was worth about 3.3 cents during 1992-93 compared to about 13.5 cents in 1970-71.

1.4 Other Economic Characteristics

The other issues which are also linked with the health of the Indian economy are the rate of inflation and employment generation. Both of these are also connected with the foreign trade. It is well known that the exports and imports are important options to maintain optimum prices for consumers and for providing economies of scale to producers by avoiding unnecessary scarcity or glut of goods in the market (see figure 1). The rate of Wholesale prices are shown in Table 1.20. We observe

Table 1.19 : Index Numbers of Foreign Trade
(1978-79 = 100)

Year	Unit	Value	Index of	Gross	Income	Exchange Rate
	Exports	Imports	Terms of Trade	Terms of Trade	of Rupee per U S \$	
(1)	(2)	(3)	(4)	(5)	(6)	
1970-71	45.0	35.3	113.9	75.2	7.50	
75-76	83.9	99.1	93.0	69.2	8.38	
80-81	108.5	134.2	127.6	87.3	7.91	
81-82	124.1	133.1	136.8	102.6	8.97	
82-83	132.0	136.3	132.4	113.0	9.67	
83-84	151.0	125.8	164.1	135.6	10.34	
84-85	169.8	161.7	129.2	126.8	11.89	
85-86	170.8	158.8	163.8	119.8	12.24	
86-87	179.4	139.4	175.0	156.0	12.78	
87-88	195.4	160.0	146.3	170.9	12.97	
88-89	232.2	185.5	147.4	190.4	14.48	
89-90	276.6	228.4	130.2	211.8	16.65	
90-91	292.5	267.7	122.5	212.2	17.94	
91-92	369.5	309.1	109.3	249.3	24.47	
92-93	421.5	331.0	126.5	283.8	30.65	
93-94	474.1	327.2	127.8	373.1	31.37	
94-95	494.6	248.9	181.7	581.6	31.40	

Source: Economic Survey, 1993-94, 1995-96 , Ministry of Finance, Govt. of India For Col.(6), BSR, All India, Vol.I, C.M.I.E., 1993

that the price- rise has been quite fast during the seventies and eighties alike. The Wholesale prices have been doubled in about a decade, which is a very high rate of inflation, compared to the situation in developed countries. It is also bad for investment, besides it dampens the consumption of non-index-linked classes of consumers. It also makes the economy high cost due to high rates of interest, since low rate of interest is necessary for investment, and to make the economy competitive in the world market. It further nullifies the likely advantage in the exports provided by devaluation of currency. So it is important to study the effect of any policy on prices of different commodities and overall price level in the economy. Further it should be studied, whether devaluation might itself cause inflation due to high cost of

imports (owing to large share of essential imports).

Table 1.20 : Rate of Inflation in India over the Years

Year	Whole-sale Price Index (1981-82 = 100)	Growth Rate of Whole-sale Price Index	GDP Deflator
1970-71	35.55		0.4391
71-72	37.54	5.60	0.4625
72-73	41.31	10.04	0.5104
73-74	49.66	20.22	0.5983
74-75	62.18	25.20	0.6962
75-76	61.50	(-) 0.09	0.6783
76-77	62.78	2.08	0.7201
77-78	66.05	5.21	0.7648
78-79	66.05	0.00	0.7791
79-80	77.36	17.12	0.8968
80-81	91.08	17.74	1.0000
81-82	100.00	9.80	1.1026
82-83	104.90	4.90	1.1903
83-84	112.80	7.53	1.2889
84-85	120.10	6.47	1.3862
85-86	125.40	4.41	1.4933
86-87	132.70	5.82	1.5926
87-88	143.60	8.21	1.7318
88-89	154.30	7.45	1.8664
89-90	165.70	7.39	2.0146
90-91	182.70	10.26	2.2530
91-92	207.80	13.74	2.5527
92-93	228.70	10.06	2.8090
93-94	247.80	10.84	3.0632
94-95	274.70	11.09	3.4027

Source BSR,All India,Vol.I, C.M.I.E.,1993, NAS, C.S.O., Minstry of Planning, Govt.of India, various issues.

Finally, the employment aspect is the most important for any country specially a country like India, with large educated work force and high unemployment rate, high man-to- land ratio and low capital availability. Let us examine the shares of broad sectors in employment over the years in India. From Table 1.21, we observe that in spite of growth in production, the secondary sector is not able to provide for sufficient or even comparable level of employment .While the share of secondary

sector in GDP has gone up over the years, its share in employment has stagnated during the last thirty years. The tertiary sector has however provided for increased share in employment during the eighties, while it was stagnating till 1981. As a result, slight drop has been observed in the burden of employment on primary sector during the seventies and eighties. With dwindling employment elasticity in secondary sector as evident from the data presented in the directional paper of the VIIth FYP (see Table 1.22), coupled with more competition in the world due to capital intensive multinational companies, it is worth studying in detail, whether it will be fruitful for a labour surplus economy like India to allow entry of MNC's with their low employment intensive technology?

Viewing the scenario on employment potential of the various sectors in India, it is important to study the effects of liberalisation of foreign trade on the structure of production and employment in India. The growth of Foreign Trade from about 5- 7 per cent of Gross National Product to over 10 -15 % may have

**Table 1.21 : Sectoral Distribution of Workers in India
(in percentages)**

Sector \ Year	1951	1961	1971	1981*	1991*
(1)	(2)	(3)	(4)	(5)	(6)
Primary	72.1	71.8	72.1	68.8	66.8
Secondary	10.7	12.2	11.2	13.6	12.7
Tertiary	17.2	16.8	16.7	17.6	20.5

* exclude Assam and Jammu & Kashmir

Source Col.2,3,4- BSR, All India, Vol.I, CMIE, Economic Intelligence Service (1991), Col.5,6 - Census of India, 1991 , Series -1 , paper-2, 1992 .

very drastic impact on the structure of production, income, employment and prices in the domestic economy (See figure 2.3). The effects may be on income distribution, inter-regional inequalities as well as on poverty level, social sectors e.g. health. Further it is not only direct effect on a particular sector in which import/export is/are liberalised, but indirect as well as induced effects are likely on many other sectors through increased/decreased supply/demand of input/substitute/subsidiary/parallel goods or services. Therefore it is of utmost importance to study with as much disaggregation as possible, the detailed effects on different producing sectors in the economy due to growing imports and exports. As it has been already stated earlier that not all the imports are undesirable as all the

Table 1.22 : Sectoral Employment Growth During Eighth Plan

S.No.	Sector	Employment	Elasticity	Employment Growth	
		(a) Achieved 1977-78 to 1983	(b) During 1983 to 1988	(c) Targets for 8th Plan	using elasticity as in (c)
1.	Agriculture	0.5	0.36	0.50	1.50
2.	Mining & Quarrying	0.7	0.85	0.85	6.38
3.	Manufacturing	0.7	0.26	0.50	3.65
4.	Construction	1.0	1.00	1.00	4.30
5.	Electricity	0.7	0.48	0.50	4.10
6.	Transport & Communication	0.9	0.35	0.60	4.20
7.	Other Services	1.0	0.42	0.70	4.27
Total		0.54	0.38	0.46	2.59

Source Directional Paper for Eighth Plan, 1993, Planning Commission, Govt. of India.

exports are not desirable either. So it is important to distinguish the desirable types of imports and exports in terms of production, domestic prices, income and employment in India.

1.5 Widespread Concerns

There are many doubts in the minds of industrialists, economists, politicians, bureaucrats, workers and the general public about the trade-liberalisation. There is a school of opinion which suggests that the stabilisation and domestic liberalisation should precede trade liberalisation (Deepak Nayar, 1993). Another view is that import liberalisation should take place only after exports pick up, as happened in Japan, Korea and Taiwan (Bimal Jalan, 1992). There is a case of import liberalisation on a selective basis rather than on a generalised level, so as to reduce the cost and improve efficiency and quality of Indian products comparative to world market and not to reduce demand of domestic goods particularly in consumer sector (Alok Ray, 1993). India has emphasised upon Export Promotion (E P) based industrial development policy frame-work with import liberalisation without detailed inter-sectoral study in this regard. As the export promotion strategy may start a retaliatory reaction from other countries and in an environment of world-wide recession, the policy may not be beneficial. It may further cause narrow production structure leading to inflation, which may result in decline in the rate of growth of economy and employment and rise in inter-group inequalities due to shift in production basket and technology.

Besides the above, there is a feeling that in a country of large population, with about 300 million people living below poverty line, export promotion strategy may cause uncertainty and instability in the economy. There are recent studies e.g. Sheehey (1992), Love (1989, 92), which indicate that if the share of exports is high in a developing economy and there is export uncertainty (which may not be avoided always), it may cause instability in the domestic economy. It may seriously affect investment in the domestic economy, which may cause serious adverse effects on income and employment in the long-run. It is therefore of great significance to study in greater details, the real implications of the liberalisation of trade policy. Such a study should try to analyse the impact of growth in imports and exports on growth, structure of production, income, employment, prices and income-distribution in the economy.

1.6 Purpose of the Study

The Foreign Trade in India has not been very important till late seventies. As such there have been few studies in India dealing with effects of foreign trade on Indian economy e.g. Bhagavati (1975), S.V.Bokil et al (1981), Padma Desai (1969), P.Abdul Nazir (1989), P.N.Mathur (1991) etc. Most of these studies have compared the efficiency of Import Substitution (I S) vs. Export Promotion (E P) as strategy for domestic industrialisation. A few other studies have also dealt with foreign trade in Input-Output frame-work e.g. Atul Sarma & Kewal Ram (1989), R.H.Dholakia et al (1992), D Sathe (1990), S Dhawan (1993). But all these studies have treated imports as leakages to domestic production, income etc., which is not the

proper way of dealing with the imports. In the contemporary period there are some standard methods of production and technology and the need of basic energy, raw materials and intermediate inputs is of varied types of goods and services. It is not feasible to be a totally closed economy, that may not be a better option even if technically feasible. However, full scale free trade either may not be a favourable option, as there is imperfect market, there are transaction costs and India is a large economy. Due to large size, when the economy is in slack or in surplus, in both the situations, the difference between the supply and demand is large. As such if the action with respect to either import or export is not taken timely as well as with proper long term view, the net costs may be high due to its effects on international prices. Immediate change in production structure and employment shift is not possible due to system rigidities in the circumstances of large illiterate, rural, poor and unskilled population. So the imports need to be divided into two categories, viz. complementary and competitive or which are essential for production in the short -run and those which are not. There is still need of support prices, subsidies and different ways of protection from market uncertainties and failures. So the main purpose of this study is to analyse in significant details, the positive as well as negative effects of liberalisation of imports and exports of different goods on the various sectors of production in the economy. There are many types of effects, which may be felt directly on some sectors, while indirectly on many other sectors, besides there may be induced effects on still more sectors due to income accrual from export growth, change in investment, production structure and prices. This study is designed to analyse the various kinds of

In the recent theories the emphasis has been put more on technology-gap between trade partners, difference in scale economies, differences in products (horizontally and vertically) due to Ohlin, Dreze, Keesing, Hafbauer. Still some more put emphasis on sophistication in technology, innovation, product diversification for growth in exports (Posner, Douglas, Gne Mehta Vernon, Keesing, Hirsch, and Wells). Later gravity models have been developed which incorporate in them, the environmental aspects like government policies, natural and induced trade impediments etc. (Jan Tinbergen, Hans Linnemanu, Penti Poyhons, Kyosti Pullianinen & Stig Eric Bergstrom). These bring the operational variables of trade flows in the model. Lately, the attention has been largely shifted towards policies of government intervention, protection of domestic industries and their effect on trade (Max Cordon, Harry Johnson, Bhagavati, Srinivasan, and Panchamukhi).

Reviewing all these aspects it is felt that the trade flows are governed by a complex set of factors, which are not fully conceived in the classical or neo-classical theories of trade. It looks as of now that it is difficult to fully explain the ground realities in any theoretical model with feasible set of variables. According to Prof. V.R. Panchmukhi (1994) "Each theory appears like a partial truth in a corner thereby being still elusive in reaching the truth". Therefore, to analyse the direct, indirect and induced effects in many runs of production cycles, it was felt that the Input-Output technique may be used. This method is based on structural relationships described by the interdependence among producing sectors. The relationships in this method are derived from technology underlying the production process rather than based on optimization theories. It is

common knowledge that in many sectors, factors are not utilised in an optimum manner in production and there are many types of wastes. The basic model keeps the variables like consumer expenditures, institutional expenditure, government policies, rules and investment, foreign trade outside the main production model. However these variables influence the model from outside i.e. exogenously .

The technology in an Input-Output model , which is central factor in the process of production, is assumed to remain relatively stable over a short time (say five years). It is designed on the basis of fixed proportions of various inputs used in production of a given output. It is not expected that fundamental changes will take place in a short time in any economy, while ceratin measures can be taken to improve efficiency.

The Input-Output Technique is one of the many techniques available to analyse any economy,like optimization methods,econometric methods,programming techniques and synthetic techniques. Each of these models differ in terms of assumptions,limitations, applicability etc. However it may be stressed here that Input-Output model is better suited for analysing the effects on the structure of production, growth, income generation, price level due to growth in imports and exports. Firstly, Input-Output tables provide much greater sectoral break-up than is available in most other analytical models. Secondly, it encompasses all productive activities into the model and direct, indirect effects due to any change in demand or production can be analysed on any sector or on the

economy as a whole. From this point of view ,it is an exhaustive model.Thirdly, the effects of other policy changes e.g. government policies, expenditures, change in tastes and affordable capacity of consumers , investment, international trade can be analysed as exogenous variable as well as in an endogenous way through semi-closed Input-Output model.This helps in analysing the effects of environmental, policy variables, comparative protection etc.,through interrelationships among industries and exogenous sectors as well as primary supplier sectors like households, through work culture, attitudinal changes etc. in Input-Output model.

Since the growth of imports in certain sectors directly and indirectly affects the demand and supply as well as price conditions, the foreign trade can be satisfactorily studied in a semi-closed Input-Output frame-work.Some of the items of imports are such ,which are not produced in an economy or can not be produced economically in the required quantities in the reasonable time span (say of 5 years), with only indigenous resources due to either capital or resource constraints or due to lack of knowledge, technology or infrastructure.These imports are part of the production technology in a regular way, and therefore are included in the production technology matrix as a separate sector, so as to distinguish their role and effect from other imports.These imports are defined as complementary imports,while other imports,which are not of regular nature and are necessitated due to short-run fluctuations in the domestic production are termed as competitive imports.The complementary imports are of continuous nature and are significant in quantities over a long period, while competitive imports are

those items which are required primarily to meet final consumption demand or for intermediate use due to intra-industry specialisation. The complementary imports are mostly proportional to the outputs of the user industries. Since exports are required to pay for these imports, so the exports are also included within the technology matrix for production. The exports also work as a user industry for exporting sectors, as well as provider of significant income, which induces further demand for many goods directly and indirectly. So foreign trade taken as an endogenous sector in the production technology matrix helps to analyse direct, indirect and induced effects on the economy due to changes in the share of foreign trade out of the domestic production. Further the effects due to competitive imports can be analysed as exogenous variable separately for such imports used for private consumption, government consumption and investment as these cause different effects on the economy.

The stimulation to the economy due to the foreign trade can be estimated with the help of backward, forward linkages to domestic production and imports and also as labour linkages using demand side (Leontief model) and supply side (Ghosh model). For analysis of prices , price model can be used with the help of value added from different sectors in the primary inputs. The detailed mathematical frame-work of Input-Output technique and the methodology adopted are presented in chapter 2.

1.8 Outline of the Study

This study consists of seven chapters. Chapter 2 describes the basic Input-Output (I-O) approach and reviews studies for analysis of foreign trade in I-O frame-work. This chapter also discusses the specific objectives and emphasis in this study and inter-alia explains the mathematical frame-work of the methodology adopted. Chapter 3 presents various sources of data collected for Input-Output tables, Import-Coefficient and Capital-Coefficient matrices, data on employment and price indices for different periods. It also explains the various adjustments made to different data to make them comparable and applicable for the present study.

Chapter 4 describes the theoretical approach for estimation of inter-sectoral linkages of external trade in a semi-closed I-O model. The empirical results in static semi-closed I-O frame-work are described and discussed in chapter 5 through direct, indirect and induced linkages of the various sectors and the foreign trade for output, income, employment and prices for the various periods under study. The analysis of empirical results in dynamic semi-closed Input-Output Trade model have been presented in chapter 6. The projections of Gross Output, Gross Value Added, their structure, Complementary Imports and the various economic characteristics, linkages of various entities for the future period are also presented in this chapter . The implications of policy changes in the field of foreign trade in the future have also been analysed in chapter 6. The effects in terms of changes in structure and growth of

roduction, income, employment and prices besides the income-distribution are analysed with the help of sensitivity analysis of alternative scenario with respect to the growth of foreign trade in the future.

A brief summary of major findings, empirical results, specific conclusions about critical sectors in the economy with regard to various economic parameters , recommendations to the policy makers based on economic implications of various findings are presented in chapter 7. It also provides some guidelines for future research in this area.

APPENDIX-I

The Major Trade Policy Announcements Since March 1990

Date/Source (1)	Details (2)
March, 1990 XI, Import & Export Policy, 1990-93, Vol. 1	<p>(a) Interlist shifts</p> <p>82 new capital goods items included in OGL list , while 153 capital goods items are shifted from OGL to the restricted list ,on grounds of domestic availability and essentiality, 55 items of raw materials, components and consumables added to OGL list.</p>
	<p>(b) REP list simplified and Extended</p> <p>REP list to cover items under limited permissible list and the canalised list. REP licences can not be used to import restricted list inputs unless specifically allowed. Value under REP licences subject to flexibility. The licences are transferable and can be used to import non-OGL capital goods which are permissible. Imports of restricted list items allowed against REP licences earned on electronic goods exported to the countries in GCA. REP licences on manufactured exports can be used to import second hand capital goods including OGL items.REP rate structure is simplified.</p>
	<p>(c) Export/Trading House Identified</p> <p>Export/Trading houses are identified on the basis of threshhold limits of net foreign exchange earnings (NFEEs) to enjoy additional licences on past export basis. These licences, like REP can be used to import a broad range of capital goods, instruments, raw materials and components. A new category of Star Trading houses introduced for exporters with exemplary export performance. Such houses are eligible for special additional licences,to be granted on the basis of NFEEs</p>
	<p>(d) Imports of certain essential raw materials and oil/oilseeds canalised through public sector agencies. Some of these items importable through REP licences and by export houses.</p> <p>(e) Supplementary licences streamlined and value limit raised.</p>

(f) Blanket Advance licences offered on a NFEE basis to exporters with minimum value added at 50 per cent. These licences are on a strict non-transferable actual user basis without any stipulation on the quality and quantity of imports.

June, 1990 The Economic Times (ET), July 12, 1990	Supplementary licences to be issued on an 18-month basis against 12 months earlier, resulting in an increased value of these licences.
September, 1990 Financial Express (FE) Sept., 27, 1990	A 15-per cent cut in free foreign exchange for the grant of supplementary licences to automobile, electronics and consumer durable industries. These industries no longer eligible for OGL route and
November, 1990 ET, Nov. 13, 1990	OGL route restored for automobile, electronics and consumer durable industries for imports of raw materials, components and consumables.
FE, Nov., 29, 1990	No fresh licences were to be issued for industrial raw materials and components. Exceptions include capital goods, expecting a lag in utilisation of their licences. Exporters exempted from the ban.
December, 1990 ET, Dec. 6, 1990	Imports of capital goods subject to higher cash margin requirement at enhanced interest rates. Payments on existing L/Cs directed to ICICI which had unused letters of credit. All foreign exchange outgo on imports effectively stopped by the RBI circular.
ET, Dec. 27, 1990	Exporters annually remitting from abroad Rs.10 crore and above exempted from cash margin requirement against raw material exports. Imports of capital goods permitted as credit lines with financial institutions are opened.
March, 1991 Economic Survey (ES), 1990-91 p-172	Imports other than capital goods subject to cash margin higher than the earlier 50 per cent rate to be deposited for opening L/C. The rates of the margin are under OGL (at 133.3 per cent); specific licences (110 per cent); supplier's credit for one year and above (50 per cent). For imports other than capital goods importers required to place cash margin with banks for three months at stipulated rates. Cash margin stipulation applicable to all the importers excepting POL and certain essential items plus those by government departments.
April, 1991 ES, 1990-91 p-173	No cash margin from April 1, for 100 per cent EOUs and for units in FTZ/EPZs against imports for own consumption when exports are to the GCA. Cash margin against export linked REP licences, Additional and special additional licences reduced subject to realisation of exports.

ES, 1990-91 On April, 22 cash margins on imports other than capital goods raised to 200 per cent on OGL. Similarly the rate enhanced to 150 per cent under specific licences.

ES, 1990-91 REP licences conditional from April 23 on realisation of export proceeds and except from cash requirement, interest rates on post- shipment export credit revised to effect quick realisation.

ES, 1990-91 Use of bank credit to finance imports discouraged on May, 9 by means of 25 per cent surcharge on commercial rates on interest at 17 per cent or above.

Appendix-II

Expansion in Open General Licence List : 1978-89 to 1988-91

Year	Number of Items under OGL (1)	No.of Capital goods items under OGL (2)	(2) / (1) (%) (3)	Change in (2) / change in (1) (%) (4)
1978-79	534	252	47.1	N.A.
1979-80	702	385	54.8	79.2
1980-81	776	428	55.1	58.1
1983-84	959	559	58.2	71.6
1984-85	1055	653	61.8	97.9
1985-88	1185	850	71.7	151.5
1988-91	1274	944	74.0	106.0

Source:-Sunanda Sen, R Upendra Das, Economic and Political Weekly,
March 21, 1992.

CHAPTER 2

THE INPUT-OUTPUT APPROACH, REVIEW OF LITERATURE AND METHODOLOGY

2.1 Introduction

The purpose of this chapter is to describe the Input-Output approach used in this study and to review the literature. In the first section, the basic Input-Output (I-O) technique has been explained in brief and in simple form. The second section is devoted to the review of studies carried out in I-O frame-work for analysing the effects of the external trade in India and the other countries. The specific objectives of this study and special emphasis laid in this exercise have been described in the third section, while the fourth section presents the mathematical frame-work of the methodology adopted in this study.

2.2 The Input-Output Approach

The Input-Output technique was first used to analyse the structure of production in the American economy in 1930's by Prof. Wassily W. Leontief (Leontief, 1936, 1960). This technique has now been accepted as an empirical tool for analysing interrelationships in the producing, consuming and labour and other factor supply sectors in an economy. The idea for studying the interdependence of various sectors in an economy was first conceived in the form of general equilibrium theory of equations, one for each producing, consuming units by Leon Walras (1874). Similar model was used in Tableau Economique by Francois Quesnay (1926) and in USSR in Chess Board (1926). Dimitriev (1904)

also used a some-what similar model of interdependency relationship between various sectors. But these models were too complex for the empirical studies. Leontief used this versatile technique, which deals with quantitative analysis of interdependence among various producing sectors, final consumption sectors. An Input-Output table, which is a table of Input-Output coefficients for various sectors (square matrix of order n, n being the number of producing sectors), forms the basis of such analyses. The next section presents the salient features of such table alongwith the fundamental relationships incorporated in the able.

2.2.1 Input-Output Table & Fundamental Relationships

The Input-Output (I-O) table presents the flow of various inputs and outputs from a sector to all the other sectors in the economy over a unit of time (usually a year). It provides the system of interdependence of various sectors of the economy in the form of a two- way table. The rows of the table present the distribution of output of a sector (associated with the row) to all the producing sectors (associated with columns) and final consumption sectors (private consumption, government consumption, investment and foreign trade). The columns of the table describe the use of various goods and services as inputs in the sector (associated with a column) from the producing sectors (associated with various rows) and primary input sectors (labour, capital, finance and other payments) of the economy. A sketch of an I-O table is shown in Figure 2.1.

Sec- to- rs	Producing Sectors			Total Intermediate Use	Final Use					
	1	2	3	| j |	n	Pvt.	Govt.	Inv.	Exp	Imp
P	1									
r	2	Inter-Industry								
o	3	Transactions								
d										
u										
c	j			| x_{ij} |		w_i		p_i	g_i	
i										
n		Matrix								
g	n									

	| T_j |	Total Inter - mediate input	p_g | v_g |
	| V_j |	Value Added	Value Added by Final Demand Categories
	| X_j |	Total Output	Total Final Use

Fig. 2.1 Schematic Presentation of Input-Output Model

Although the I-O table was first prescribed in physical terms (physical quantities of inputs and outputs and units of services); but due to practical difficulties, most of the analyses are conducted in value terms nowadays. So all the entries are given in value terms.

The use of outputs of various sectors (goods and services) has been distinguished as intermediate use and final use. While the intermediate use has been defined as the use of goods and services produced in the system by the producing sectors, the final use is that part of the output used as the direct consumption of various goods and services by various types of consumers and institutions. The primary inputs are those, which are not produced in the system e.g. labour, capital, finance etc. These transactions are presented in a tabular form in four quadrants. Figure 2.1 presents these four types of transactions as follows.

- (a) Inter-industry matrix ;
- (b) Final Demand matrix ;
- (c) Primary Input (Value Added) matrix ; and
- (d) Final Demand of primary inputs.

The transactions in the first quadrant are also defined as Inter-industry transactions matrix ((X_{ij})), where X_{ij} denotes the delivery of output from sector i to sector j. Since each producing sector is represented as producing as well as a consuming industry, this forms a square ($n * n$) matrix with n producing sectors. The total supply of output from ith sector, to all the producing sectors as input for intermediate use is

denoted by W_i in the column of total intermediate use. In the same way, the total intermediate use as inputs by j th sector from all the producing sectors is denoted by T_j in the row vector of total intermediate inputs.

The supply of outputs from various producing sectors for direct use to various final use categories are second type of transactions recorded in an I-O table. These include private consumption, government consumption, fixed investment, change in inventories, exports and imports (as negative use). The total of these are called as final demand. In figure 2.1, these are denoted by G_i , P_i , I etc. represented by government consumption of

i i i
consumption of i th good, private consumption, or use in investment of i th good or service respectively.

The third kind of transactions in an I-O table refer to the use of primary inputs by producing sectors. In the I-O terminology, the primary inputs are those services, which are not directly described in the system of producing sectors. Therefore labour (in the form of wages, salaries, other emoluments etc.), land and buildings (in the form of rent), capital stock (in the form of depreciation, hire charges) or indirect taxes for government services (like law & order, regulations, international relations etc.) are regarded as primary inputs or value added in I-O system. This concept of primary inputs or value added is corresponding to the concept of value added in the national income. In the figure 2.1, these transactions are represented as V_j , as value added generated or primary inputs used in the j th producing sector.

The fourth and final category of transactions shown in figure 2.1 , is the supply of primary inputs by final expenditure categories.it is necessary to include these transactions to make the I-O table consistent with the national income accounting frame-work.

The total production in a sector i, termed as X_i is defined as the sum of all deliveries to various producing sectors and the final users from the sector i. It may be represented as below.

$$X_i = \sum_{j=1}^n X_{ij} + \sum_{k=1}^m F_{ik} \dots \dots \dots \quad (2.1)$$

$, i = 1, 2, \dots, n$

where F_{ik} is the supply of output from i th sector to the k th final demand category.

As the total value of production of all the producing sectors is equal to the total cost of production in each sector in the I-O table, the sum over the rows is equal to the sum over the columns, for any given industry.

Thus,

$$\sum_{j=1}^n X_{ij} + \sum_{k=1}^m F_{ik} = \sum_{i=1}^n X_{ij} + V_j \dots \dots \dots \quad (2.2)$$

($i = 1, 2, \dots, n, j = 1, 2, \dots, n$)

Further , the sum of all intermediate use and the sum of all final use should be equal to the sum of all intermediate inputs and the sum of total value added for all the sectors taken

together.

Therefore

$$\sum_{i=1}^n \sum_{j=1}^n x_{ij} + \sum_{i=1}^n \sum_{k=1}^m F_{ik} = \sum_{j=1}^n \sum_{i=1}^n x_{ij} + \sum_{j=1}^n v_j \dots \dots \dots (2.3)$$

$$(i=1, 2, \dots, n, j=1, 2, \dots, n, k=1, 2, \dots, m)$$

From the equation (2.3) above, it is derived that the sum of value added is equal to the sum of all supply to the final demands. Or

$$\sum_{j=1}^n v_j = \sum_{i=1}^n \sum_{k=1}^m F_{ik} \dots \dots \dots (2.4)$$

The equation (2.4) above is one of the important identities of Input-Output model.

The original I-O model envisaged by Leontief was closed system, in all expenditures were associated with the purchase of inputs in the production process e.g. private consumption for provision of labour services, government consumption for providing government services like law & order, security, infrastructure, legal frame-work, financial system etc. and so on. Such a model is defined as **closed** Input-Output model. In a system where all the final use including external trade is taken as exogenous or outside the system, the primary inputs are also taken out of the system of direct production is defined as **open** model. In such models, the behaviour of consumers, government consumption, external trade etc. are responsible for determining the levels of final expenditure and not the levels of production and inputs directly. Open models have been used widely in the economic

empirical analyses, the world over. However the indirect effects of certain final demand categories are such that the effects are felt in a very short time of days and months e.g. private consumption, foreign trade. The growth of certain imports affects the supply in the market and interalia the prices of the concerned products and their substituting goods as well. In this way the production of the concerned sectors and that of the sectors supplying various inputs to the affected producing sectors, as well as the sectors which receive the inputs from the affected sectors , are indirectly affected. A chain of effects through production runs sets in,which is similar to the iterative production interdependence in the production sectors themselves. So it is felt fruitful to include one or more of the final demand categories as part of the production sectors, with a balancing sector on the supply (row) side e.g. private consumption and wages and salaries or government consumption and indirect taxes and so on. Such models are termed as **Semi-Closed I-O** models. It is because some of the final use categories (but not all) are included in the inter-industry transaction matrix.In the present study a Semi-Closed I-O model incorporating the Exports (a final use category) and the Complementary Imports (to be defined in section 2.5) in the inter-industry transaction matrix has been applied for studying the indirect and induced effects of changes in the foreign trade on the structure of production,income,employment, and prices various sectors in the Indian economy. The impact of foreign trade by way of imports and exports on the economy can be studied in three forms ,viz., (i) in real physical form; (ii) in price terms ; and (iii) in value terms. The impact of foreign trade in the above three ways can be

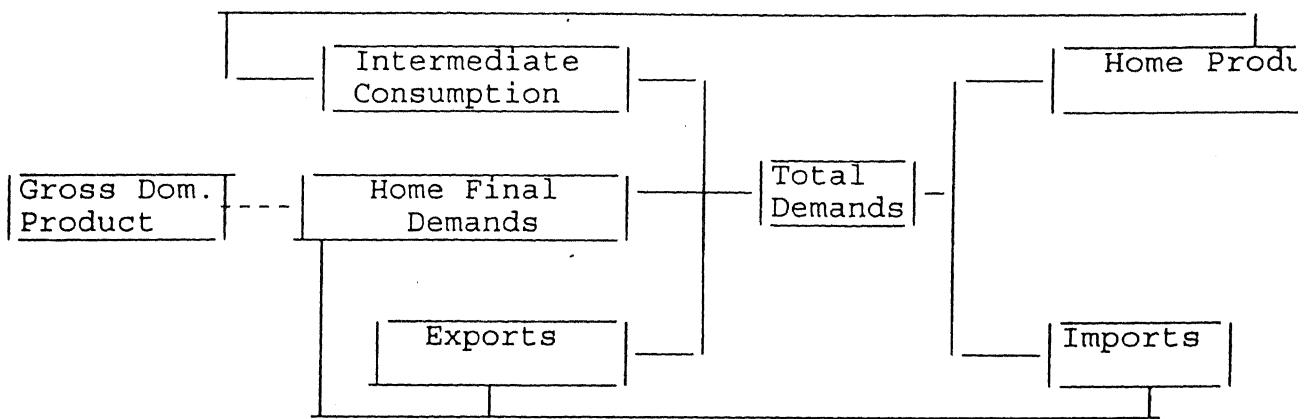


Fig. 2.2 Real Circuit

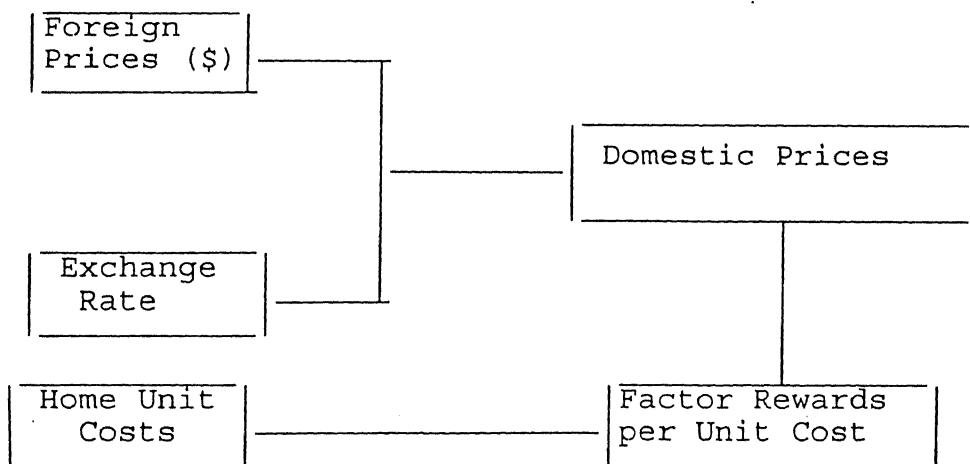


Fig. 2.3 Price Circuit

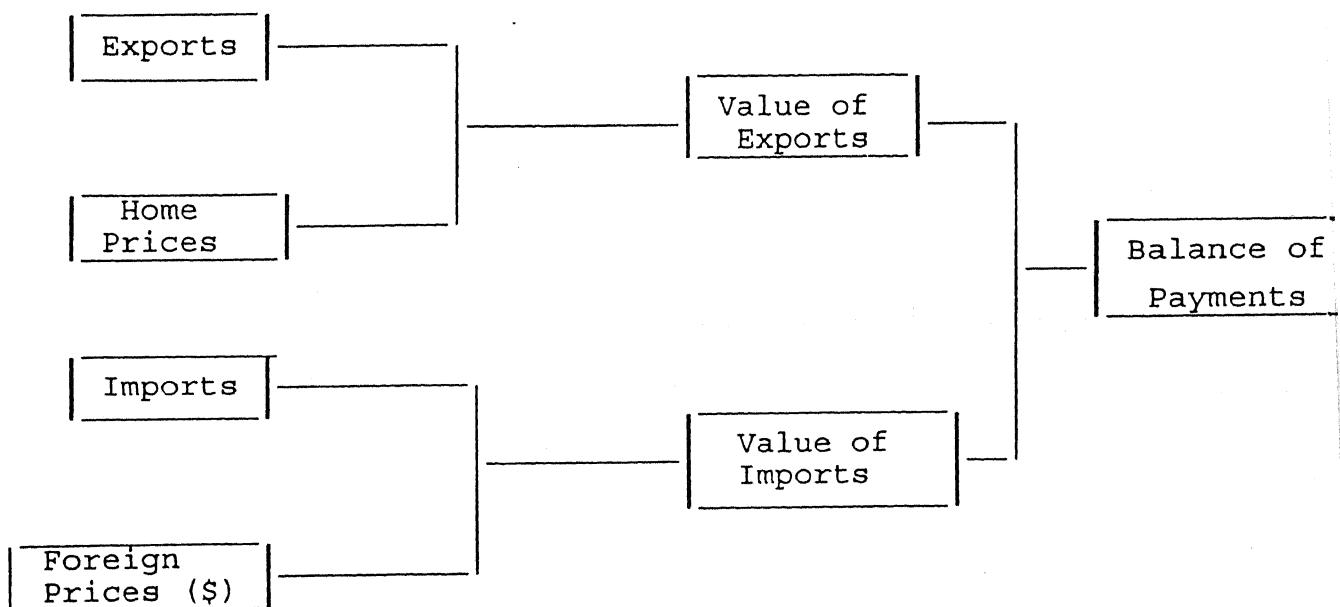


Fig. 2.4 Value Circuit

(ii) The second assumption defines that there is a fixed proportion of Leontief Production Function. It may be explained as, the quantity of each input used by an industry is a constant proportion of the output of that sector, i.e., the amount of each type of input used in a producing sector varies directly in proportion to its output. Alternatively, there is constant return to scale in each sector and there is no substitution among the inputs in a given process of production.

(iii) The third important assumption states that the level of total output in each sector is sufficient to meet the intermediate and final demand for the output of the sector concerned. This condition is referred to as 'Hawkins-Simon Condition' (1949), defining that the output X_i should not be less than the direct and indirect requirements of the output of N the sector.

Besides the above basic assumptions, it is assumed that there are no externalities among the production activities, i.e. the sum of inputs used in the simultaneous production of several products is the same as the sum of the inputs used in the production of each separate products.

Although these assumptions seem to be rigid, it may be stressed that the overall usefulness of the I-O model is not determined by the validity of its assumptions, but rather by the accuracy with which it is able to predict certain economic events (Friedman, 1953).

2.2.3 The Basic Open Input-Output Model

The Input-Output coefficient or the technical coefficient can be derived as below.

$$a_{ij} = \frac{x_{ij}}{x_j}, \forall i, j = 1, 2, 3, \dots, n \quad \dots \quad (2.5)$$

The technical coefficients describe the amount of each input required for producing a unit of sector j . These are arranged in a matrix, in the order of inter-industry transaction matrix. This matrix is called as Technical Coefficient matrix, denoted by A .

$$A = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ a_{31} & a_{32} & \dots & a_{3n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{bmatrix} \quad \dots \quad (2.6)$$

This matrix describes the technology of production during the referred time period.

As defined in equation 2.1, the following equations can be expressed as below.

$$\begin{aligned}
 X_1 &= X_{11} + X_{12} + \dots + X_{1n} & F_1 \\
 X_2 &= X_{21} + X_{22} + \dots + X_{2n} & F_2 \\
 X_3 &= X_{31} + X_{32} + \dots + X_{3n} & F_3 \\
 \cdot &= \cdot \quad \cdot \\
 \cdot &= \cdot \quad \cdot \\
 \cdot &= \cdot \quad \cdot \\
 X_n &= X_{n1} + X_{n2} + \dots + X_{nn} & F_n
 \end{aligned}
 \quad (2.7)$$

The Input-Output model is essentially a production model based on inter-sectoral relationships determined by technological requirements. In this model, technical coefficients are assumed to be fixed (for a time period) and final demands are exogenous to the model. The quantity and price are two distinct entities and can be analysed independently of each other.

From equations (2.5) if we substitute a X_{ij} in place of X_j , we can express (2.7) as follows.

$$x_i = \sum_{j=1}^n a_{ij} x_j + F_i \quad \dots \dots \dots \quad (2.8)$$

$i = 1, 2, \dots, n$

This system of equations can be expressed in matrix notation as below.

$$\tilde{X} = \tilde{A} * \tilde{X} + \tilde{F} \dots \dots \dots \quad (2.9)$$

where

X = $n * 1$ vector of gross outputs ;

A = $n * n$ matrix of technical coefficients ;

F = $n * 1$ vector of final demands.

Solving equation (2.9) for gross output, we get

$$X = (I - A)^{-1} F \text{ or } \dots \dots \dots \quad (2.10)$$

$$X = R * F \dots \dots \dots \quad (2.11)$$

The equation (2.10) or (2.11) describe the relationship of total output and final demand in the Input-Output model. It can be used to estimate the level of output required to satisfy a given final demand as well as the demands of the producing sectors of their intermediate inputs in producing the required output. The elements of the inverse matrix R can be termed as described in the equation presented below.

$$^{-1}$$

$$\text{where } R = (I - A)$$

(the Leontief inverse), as defined above , account for both direct and indirect input requirements associated with production of a given level of final demand vector. Each R_{ij} measures the stimulus to the i th gross output when final demand for j th item is changed by one unit.

With the help of (2.11) , we can also calculate the primary input requirements of production activities. For example, let us take labour. If information on sectoral employment is

available, the direct labour-output coefficient can be defined as follows.

$$l_i = \frac{L_i}{X_i}, i=1,2,\dots, n \dots \quad (2.12)$$

where

L_i = labour employed in sector i (in numbers);

X_i = gross output of the sector i (in value); and

l_i = direct labour output coefficient i.e. input of labour per unit of output in sector i .

As in the case of technical coefficients, the primary input coefficients are also assumed to be fixed in the short run due to no substitution among the primary inputs. The labour requirement can thus be estimated as follows.

-1

$$L = \langle l \rangle^{-1} * (I - A) * F \dots \dots \dots \quad (2.13)$$

where

L = $n \times n$ matrix of total labour requirements associated with the production of final demand F ;

and $\langle l \rangle^{-1}$ = $n \times n$ matrix of direct labour output coefficients.

Here $\langle l \rangle^{-1}$ can be extended by adding $(n+1)$ th row and columns of 0s for foreign trade sector. It can be used to estimate indirect and induced labour and income linkages due to foreign trade as for forward output linkages of complementary imports and backward output linkages of exports. The matrix $\langle l \rangle^{-1}$ is the diagonal matrix made with the help of the labour-output coefficient vector of the same size.

2.2.4 Price-Model in Input-Output Frame-Work

The method of average cost pricing is assumed in analysis of cost-price relationships in Input-Output model. Therefore, the cost of each product is determined by the weighted average of all input prices, with weights being the proportion of inputs used. If the Input-Output table is available in physical units and not in values, the accounting identity between receipts and expenditure in the jth sector is expressed as follows.

$$\frac{p}{j} X_j = \frac{p}{1} X_{1j} + \frac{p}{2} X_{2j} + \dots + \frac{p}{n} X_{nj} + p v \frac{v}{j} V_j \quad (2.14)$$

where

$\frac{p}{j}$ = price of the output of the jth sector ; and
 $p v \frac{v}{j}$ = price associated with value added in the jth sector
and $v \frac{v}{j}$ = value added in the jth sector.

dividing both sides of (2.14) by X_j , we get

$$\frac{p}{j} = \frac{p}{1} \frac{a}{1j} + \frac{p}{2} \frac{a}{2j} + \dots + \frac{p}{n} \frac{a}{nj} + p v \frac{v}{j} V_j \quad (2.15)$$

where

$$v \frac{v}{j} = V_j / X_j ,$$

the value added generated per unit output in the jth sector.

In the equation (2.15) , the first n terms describe the cost of intermediate inputs required to produce unit output and last term specifies the value added per unit output in sector j.

In matrix notations, (2.15) can be expressed as:

$$\begin{aligned} P - A' P &= V \quad \text{or} \\ (I - A') P &= V \quad \text{or} \\ P &= (I - A')^{-1} V \end{aligned} \quad \dots \dots \dots \quad (2.16)$$

where

$$\begin{aligned} P &= n * 1 \text{ vector of prices of output of sectors ;} \\ V &= n * 1 \text{ vector of value added per unit of sectoral} \\ &\quad \text{output ; and} \\ A' &= \text{transpose of the technical coefficient matrix.} \end{aligned}$$

alternatively P can be expressed as

$$P' = V' (I - A)^{-1} \quad \dots \dots \dots \quad (2.17)$$

Equation (2.17) shows that the changes in prices of output can be estimated with the help of data on changes in detailed composition of value added matrix v (if technical coefficient matrix is assumed to be stable).

In the above equations, it has been described how standard Input_output technique can be used to estimate the change in output levels, sectoral price levels, sectoral primary input levels based on changes in demand or changes in prices of value added. Similar estimates can be made for change in specific category of final demand and value added ,price of specific primary input. However, the above applications are strictly from the perspective of demand driven production cycle. It is called traditional Leontief model. This model does not explain things from the supply angle. This model is not in a position to explain the effects on the economy if there is a change in one or more sectors supplying inputs. For this I-O model developed by A.Ghosh

(1958) needs to be used, which helps in tracing the effects from the supply side changes. This model is briefly described below.

2.2.5 Input-Output Supply Driven Model

The n sector Input-Output equations can be written by summing down the columns as below.

$$X' = i' Z + V' \dots \dots \dots \quad (2.18)$$

here (') denotes transpose matrix

and

X' = a row vector of gross outputs;

Z = the inter-industry transaction matrix ;

V' = row vector with value added in different sectors;

i' = row vector of identity.

In this formulation, the interrelationships are fixed in such a way that supply of output of a sector is distributed in fixed proportion to other sectors. It is assumed so for each sector. From this we get the output coefficient (analogous to input-coefficient in demand model) , matrix

*

A as below.

$$a_{ij} = z_{ij} \dots \dots \dots \quad (2.19)$$

where n

$$z_i = \sum_{\substack{j=1 \\ j \neq i}}^n z_{ij}$$

$$A = (X) \quad Z \dots \dots \dots \quad (2.20)$$

*

here A is derived by dividing the elements of each row of the Z matrix by the total output of that row vector. Thus we get the following.

$$X' = X' A + V' \dots \dots \quad (2.21)$$

which gives the supply side Input-Output solution (Output Approach) as below.

$$X' = V' \left(I - A^* \right)^{-1} \dots \dots \dots (2.22)$$

* If we denote the elements of the matrix $(I - A)$ ⁻¹ by R_{ij} , then equation (2.22) can be expressed as :

From this formulation, we can see that the relationship between output of a sector can be linked with value added in that sector, because $A *$ matrix is assumed to be fixed in short time period. Therefore the stimulus in the output due to unit increase in value added in a sector can be found out with the help of Supply-Model. The total increase in output for the whole system is given by the following equations.

$$\sum_{j=1}^n R_{ij}^*, \text{ the row sum of the } (I - A)^* \text{ matrix}$$

The $(I - A)$ matrix may be referred to as the Ghosh inverse or the output inverse matrix.

2.3 Review of Literature

In this section, the studies conducted in the past to analyse, the effects of foreign trade on the economy in Input-Output frame-work and the general trade theory have been

The foreign trade has not been very significant since the beginning of the planned development period in India, which started in the early fifties. It was treated as the residual sector. This was due to the Import-Substitution (I S) based industrial development policy followed during that period. The export pessimism was quite prevalent as the exports depended largely on external factors and the efforts in this direction were not certain to achieve results in a short run (Bhabatosh Datta et al, 1962). It was felt that some study should be done separately for the competitive imports, which may be important to analyse the impact on the economy (Padma Desai, 1969). It was studied that there is positive impact of Import Substitution based industrialisation and there is a limit to the imports (Bhagvati , 1975). But in the less developed countries generally, there is low price elasticity of import demand because imports are generally of the essential nature. So the price tariffs are not effective and non-price tariffs only could be used. As there was balance of payments problem recurring, it was necessary to curtail imports of non-essential nature. So the proportion of trade was small (Bez, 1978 , Taylor, 1975 and Underwood, 1976).

Yan (1968) studied the comparative capital and labour requirements of export promotion and import substitution policies. Petri (1974) studied the impact of import substitution on the economy. Cohen (1970) analysed that the countries facing trade deficit continuously find it difficult to decide about the policy. It was the tendency in the development process that the domestic demand of export-goods and exportables increases due to growth in income, which forces domestic prices to increase for

the raw materials (due to industrial demand) and for capital goods due to imported technology. This gave domestic producers higher advantage in the domestic markets (Bhabatosh Dutta et al, 1962). In the initial phase of development , the imports are also necessary , particularly that of the capital goods and raw material type for the growth of the domestic industry. It implies deliberate policy of consumption cut and growth in savings. Thus a study to analyse the specific imports and exports for the growth of domestic industry with emphasis on low cost is necessary. No general policy of import restriction or export promotion is feasible.

Further the Less Developed Countries (L D Cs) happen to create excess capacity in the short run either due to initial low demand or raw material shortage or infrastructural bottlenecks hampering full capacity production. Import substitution may also cause some problems. In such cases, export promotion may help if the cause is the low demand, but in other cases it may be helped by liberal imports only (I M D Little, 1976). The effect of excess capacity vis-a-vis export performance was analysed by Franken (1971) and its effect on prices of exports was analysed by Theil (1975). Naya (1972) did the study of the international trade and its linked systematic comparative analysis at the international level for partner countries in trade. The study of S.V. Bokil et al (1981) concluded that the imperatives of growth were the main cause for import substitution programme, rather than export pessimism. Even in the eighties, according to them, those imperatives were valid. But the share of foreign trade has gradually increased over the years. So there might be some modification in that inference.

D.P.Pal has studied that the import substitution has not been successful, as the indirect imports did not decrease but these have rather increased.In case of direct imports also ,few sectors could have positive import substitution. There was lot of variation from sector to sector in import substitution. This study is in Input-Output frame-work.P.Abdul Karim (1989) found that domestic demand is the most important content of imports, but growth in output can be achieved faster through export promotion (expansion) more than that was due to the import substitution,which restricts demand, while the former promotes the demand.

Another aspect of distortion due to the export-led growth is the narrow market structure, polarised income-distribution, heavy import leakages and enclave effects (due to growing international dependence) as propounded by Diaz Alejandro (1975).But Chenery & Taylor propound that the size and the resource base are the important factors in influencing the structural pattern of production.The variance in policies appeared to delay a given less developed country along its pre-ordained development path.The policy changes can not significantly change the pattern of production.

Some studies have shown on the basis of regression analyses that export-led economies grow rapidly or the exports cause rapid growth (David Dollar, 1992).But with alternative measures of relationship such hypotheses are not confirmed.Sheehey (1992) and M.Shahid Alam (1991) have analysed the trends in exports and growth in domestic product excluding exports (share of exports out of the domestic product)

and found no significant relationship. They seem to find that the causation is in the other direction i.e. from growth to exports' growth, where the exports grow due to internal strength of the economy rather than exports' growth affecting the growth in the economy. The export-led economies or the economies with significant share of foreign trade are prone to instability in the economy due to instability in exports, which are quite possible due to economic cycles in the world and many external reasons not related to the domestic economy but happening in the partner countries (Love, 1990). Particularly , it may affect capital formation due to instability in capital imports and demand of investment (Love, 1992). ~~Thus~~; there is no final word about the policy with regard to Import Substitution or Export Promotion policy in case of a less developed country.

In this context it was emphasised in the Hecksher-Ohlin Theory of Factor Proportion. Later many contributions have been added in this aspect e.g. Leontief (1953, 1956) , Stopler and Rosekemp (1961), Tatemoto and Ichimura (1959), Bharadwaj (1962) . While the studies by Bharadwaj (1962) for India and Stopler and Rosekemp (1961) supported the H-O Theorem, the others did not seem to agree. Later S.Naya (1967) emphasised the need of natural resources as a factor influencing the trade. Human capital was also considered important in this regard (Leontief, 1964) . A.K.Sengupta (1989) had studied the Indian trade and found on the basis of an aggregated model that the H-O Therem is valid in case of India. Leontief and Sengupta have studied the context of trade in Input-Output approach. James McGilvery & David Simpson (1972) have analysed the factors

influencing the foreign trade, which may include demand conditions, specific character of resources and market imperfections besides the other usual ones.

Another way of analysis of the foreign trade has been through the concept of Domestic Resource Cost (D R C) and Effective Rate of Protection (E R P) for producing or saving a net marginal unit of foreign exchange (Bruno, 1972). James Reidel (1975) analysed the resource allocation consequences of foot loose industrial structure in a L D C . He concludes that D R C savings can be affected due to imported inputs particularly the intermediate ones. Alejandro Foxley (1976) had analysed the impact of foreign trade in a Linear Programming model. In a general equilibrium model of world trade, F. Brown & J. Whalley (1980) analysed the effects of liberalisation of world trade. He concludes that the tariff cutting will provide welfare gains for European Economic Community nations significantly and modestly for United States of America, while the other countries would lose. However if all the tariff and non-tariff barriers are removed, then the other countries may gain marginally. In a similar model Thijs Tan Raa & D. Chakraborty (1991) state that India may gain in mining, manufacturing and utilities sectors compared to Europe. Deregulation of these sectors would make significant improvement in efficiency and investment with more specialisation. The development of other sectors would involve costs (e.g. agriculture). According to Jeffery R. Round (1985), the liberalisation of trade will help transmit the expansionary or contractionary trend in one region to the other regions. E. Helpman (1990) has opined that the intra-industry trade is non-competitive in nature. The exports are positively influenced

by technical development and negatively related with domestic demand. So as per this study the other policies may not be effective in boosting exports (e.g. subsidy or currency devaluation). Further Richard Weiskoff and Edward Wolff (1975) analysed on the basis of a study of Puerto Rico that there exist a counteractive set of effects of liberalisation of imports. The industrialisation process leads to stability in the levels of import dependence.

In the area of effect of foreign trade on employment, Adolfo Figueroa (1975) found that in case of Peru, the labour absorption in the modern manufacturing firms was low, demand structure also affects the rate of industrial employment. It will help in any economy where income and wealth distribution is skewed and percolation down effect is not high. Jacob Kol (1991) analysed the effect of international trade on employment in less developed countries e.g. Indonesia, South Korea, Mexico and Pakistan. He found that in their trade with EEC these countries will gain in domestic employment, while EEC countries will lose some employment. This study is in Input-Output frame-work. Hazari & Krishnamurthy (1970) also found in Indian case that the policy of development of non-agricultural sectors would be constrained by lack of employment generation. Yhi Minho & Donald L. Huddle (1976) have found that the small scale industries provide opportunities for higher growth in employment. Their participation in exports is also high and these have high income elasticities. In case of large scale sector, their employment elasticities are low and their import intensity is high compared to the small scale industries.

With regard to the effect of foreign trade on income-distribution also there have been some studies. Alejandro Foxley (1976) in a multi-sector model had studied the effects of income-redistribution on the pattern of sectoral consumption. The growth effects are found to be negative while employment effects were positive. It would lead to increase in consumption and thus might negatively affect exports. Victor E. Tokeman (1975) analysed the effects of income-redistribution for Ecuador and found that its effect on employment was positive but if it is complemented with technological policy promoting labour intensive technology, the employment effect would be very highly positive. So in case of import of technology, these effects might not be high, while redistribution of income might be in the opposite direction due to negative trend in prices.

When we review the literature on the aspect of price effects of foreign trade, we see that H.D. Evans (1972) in a general equilibrium model of trade and protection minimized private consumption and government expenditure subject to constraints on commodity balance and primary resource limits in a Linear Programming frame-work. John R. McKean and Garth Taylor (1991) had used Input-Output model to quantify the inflationary impacts of changes in primary inputs on the domestic processing sectors. They found in case of Pakistan economy that the tax rate, import prices, terms of trade all affect the domestic price level. In a seminal contribution P.N. Mathur (1991) had concluded that the developing countries, due to their low market share in foreign trade, are price takers in both the cases i.e., w.r.t. exports or imports. The world price (together with production

technology, extent of direct and indirect imported inputs) determines the wage rate (and price structure) in the developing country. Thus on economic grounds, increasing physical productivity of basic wage goods through the use of expensive imported intermediate and capital goods is not feasible. Prabirjit Sarkar (1992, 1992a) explained that the depreciation of Rupee had not improved the export performance of India and thus had adversely affected the balance of trade during 1971-90. Further, the terms of trade had gone against the primary goods from less developed countries. F.M. Sherer and Keun Huh (1993) have analysed the impact of high-technology imports on Research and Development (R & D). They have found even in case of developed countries such effects to be negative for the growth of R & D in the short run. It leads to technology-gap in the long run. In case of import of technology from the developed to the developing countries, such effects may be much more serious for the indigenous R & D.

These were some of the studies which were in the field of effects of or on foreign trade vis-a-vis domestic economy in various aspects. In the next few paragraphs, the comparative study of methodologies adopted in Input-Output frame-work for the analysis of effects of foreign trade in different countries has been presented.

J.R.C. Lecomber (1970) had presented schematically the detailed comparision of Input-Output studies for analysing the effects of foreign trade for various countries. The comparative analysis of I-O models as referred in his paper are presented in Appendix 3 . Out of the seventeen models presented, ten had used

the Leontief Open Static model. Nine of these models classified imports by user and industrial imports were proportional to the output levels. The external account was left unbalanced in six of these and balanced by adhoc methods in two studies. One model (s.no. 12) divided imports into competitive and complementary segments ; competitive imports, classified by commodity-type were linearly related to total competitive imports allowed by the balance of payments constraint. Four models were programming models, in which the treatment of foreign trade was unsatisfactory (as described by Lecomber). There was one multi-regional model and another multi-regional model of the world in which prices were exogenous and balance of payments were left unadjusted.

In most of these models, foreign trade (exports particularly) was treated as exogenous or was taken as a fixed proportion of the total output or was taken as a function of prices and in one model it was considered endogenous via foreign trade multiplier. In some models, exports were allowed to vary freely or in some exogenous bounds. Later however in some models, foreign trade had been endogenised, by subtraction of import-transaction matrix from the transaction matrix. Such resultant matrix was treated as 'Domestic Transaction Matrix'. This method has been used by V.Bulmer Thomas (1978, 1979, 1982), Atul Sarma & Kewal Ram (1989), D.Sathe (1990), S. Dhawan (1993), R.Stone (1970), T.S.Barker (1974), Hadley (1969), A.K.Sengupta (1989) etc. R.H.Dholakia et al (1992) have dealt the total matrix including imports as domestic transaction matrix for analysing the export promotion.

'Foreign trade, accumulation of capital and technical change are most important for projection of structure of production in any economy' (Leontief, 1981).

The interdependence of foreign trade and capital formation with technical change may be studied with the help of a dynamic model with foreign trade endogenised as in Leontief model. This study draws heavily from Leontief (1956), and Cambridge Growth Model (1972) , and Barker T.S. (1972). The following paragraphs present the models of some of the studies mentioned above in detail. Besides models of some other important studies which have a relationship with foreign trade have also been presented alongwith their limitations.

2.3.1 LEONTIEF MODEL

The imports are divided into two parts viz.complementary (non-competitive)and competitive imports.The complementary imports and exports are treated as endogenous sectors while the competitive imports are treated as exogenous sector alongwith the other final demands.The model is given as below-

$$\begin{bmatrix} I & -A & -b \\ \hline & \dots & \\ -d & & 1 \end{bmatrix} \begin{bmatrix} X \\ \hline e \end{bmatrix} + \begin{bmatrix} C \\ -1 \end{bmatrix} Z = \begin{bmatrix} r \\ \hline \dots \\ r_d \end{bmatrix}$$

Where

X is a vector of outputs;

\sim

e is value of total exports;

Z is value of total competitive imports;

d is row of non-competitive import-coefficients;

\sim

b is column of export-coefficients (out of total exports);

\sim

c is column of competitive import-coefficients (out of total competitive imports);

r is column of residual constants (out of final use other than the exports);

r_d is the part of non-competitive imports for final use;

\sim

K is the row of capital coefficients.

\sim

From the above we can deduce as below.

$$[X] = (I - A)^{-1} [(b)e - (C)Z + (V)] \text{ and}$$

$$[K][X] = (K)[I - A]^{-1} [(b)e - (C)Z + (V)]$$

The capital requirements for the replacements of the competitive imports can be derived as below with the help of the Leontief model-

$$[K | 0] \begin{bmatrix} I - A & | & -b \\ \hline -d & & 1 \end{bmatrix} \begin{bmatrix} C \\ \hline -1 \end{bmatrix} = [K_n | K_b] \begin{bmatrix} C \\ \hline -1 \end{bmatrix}$$

$$X - AX - e + Z = r \quad (\text{Production \& Distribution})$$

$$e - d - Z = r_d \quad (\text{Balance of Trade})$$

$$\text{or} \quad X + Z = AX + e + r$$

2.3.2 CAMBRIDGE GROWTH MODEL

In this model, the imports are divided into competitive (m_1) and complementary (m_2) as below-

$$m_1 + x = w_1 * i + h_1 + e \quad (\text{for domestic outputs and competitive imports})$$

$$i' * m_2 = i' * w_2 * i + i' * h_2 \quad (\text{for complementary imports only})$$

$$\text{Here } m_1 + m_2 = m \quad (\text{total imports})$$

$$w_1 + w_2 = W \quad (\text{technology matrix for the total economy})$$

The four relationships can be stated as below-

$$(i) \bar{w}_1 = \hat{A} \hat{x}$$

where \hat{A} is a matrix relating inputs of goods (regardless of source) to domestic output;

$$(ii) m_1 = a_{m_1} + b_{m_1} * i' m_1$$

where a_{m_1} , b_{m_1} are coefficient vectors relating the competitive imports to their total

$$(iii) i' * w_2 = a'_{m_2} * \hat{x}$$

where a_m^2 is a vector relating to complementary imports to user outputs ; and

$$(iv) \beta = i' (e - m_1) - i'^* m_2$$

where β is the balance of trade in constant prices.
we can find the vector x as below-

$$\begin{aligned} x &= A * x + h_1 + e - a_{m_1} - b_{m_1} (i' e - a_{m_2}^* x - i' h_2 - \beta) \\ &= [I - A + b_{m_1}^{-1} a_{m_2}^*] * [h_1 + e - a_{m_1}^* (i' e - i' h_2 - \beta)]. \end{aligned}$$

This treatment of input-output relationship can accommodate changes in the ratio of imports and domestic output of intermediate products without re-estimation of the input-output relationship in the model. However it is not practicable to bring the international production technology matrix within the transaction matrix particularly when the complementary imports are obtained from many countries and their technologies may differ significantly.

2.3.3 GENERAL MULTI-COMMODITY TRADE MODEL

In this model also the technology has been divided into domestic and that for the imported products. The equations can be expressed as below-

$$x = W_d * i + h_d + e_d$$

$$m = W_m * i + h_m + e_m$$

where x is vector of domestic outputs, m is the vector of imports. W_d, W_m are matrices of absorption of domestic outputs and imports respectively by domestic outputs;

h_d, h_m are vectors of final demand for domestic output and imports ;

e_d, e_m are vectors of exports of domestic outputs and imports (re-exports).

$$\text{Let } W = W_d + W_m, h = h_d + h_m, e = e_d + e_m$$

and if $e_m = 0$ (i.e. re-exports are treated as nil), $e_d = e$,

then

$$m + x = W * i + h + e \quad \text{or}$$

$$\begin{bmatrix} x \\ \dots \\ i' * m \end{bmatrix} = \begin{bmatrix} W_d * i \\ \dots \\ i' * W_m * i \end{bmatrix} + \begin{bmatrix} h_d \\ \dots \\ i' * h_m \end{bmatrix} + \begin{bmatrix} x \\ \dots \\ 0 \end{bmatrix}$$

Leontief had summarised it as follows-

$$i' * W_m = a'_m * \hat{x}, \quad i' * h_m = a_m * h \text{ and } l = a_e * i' * m$$

where

a_m = vector of import-output coefficients;

$a_m h$ = a scalar; and

a_e = a vector of coefficients relating each export to total imports

$$W_d = A_d * \hat{x} \quad \text{here } A_d \text{ is matrix for inputs of domestic}$$

outputs.

and thus

$$\begin{bmatrix} x \\ \dots \\ i' * m \end{bmatrix} = \begin{bmatrix} A_d * x \\ \dots \\ a'_m * h \end{bmatrix} + \begin{bmatrix} h_d \\ \dots \\ a_m * h \end{bmatrix} + \begin{bmatrix} a_e * i' * m \\ \dots \\ 0 \end{bmatrix}$$

so we can deduce x as below-

$$\begin{aligned} x &= A_d * x + h_d + a_e (a'_m * x + a_m * h) \\ &= [I - A_d - a_e * a'_m]^{-1} * [h_d + a_e * a_m * h] \end{aligned}$$

the above formulation was applied by Lecomber (1970). But in this formulation the imports and the domestic outputs have been segregated for use in production of domestic outputs, which in practice may not be feasible.

2.3.4 SYNTHETIC MODEL

In this model, the technology coefficient matrix has been treated as synthetic, made of domestic and imported products. The model is described as below.

$$\left[\begin{array}{c|c} A_h & 0 \\ \hline \cdots & \cdots \\ A_m & 0 \end{array} \right] \left[\begin{array}{c} X_h \\ \cdots \\ X_m \end{array} \right] + \left[\begin{array}{c} D - D_m \\ \cdots \\ D_m \end{array} \right] = \left[\begin{array}{c} X_h \\ \cdots \\ X_m \end{array} \right]$$

here A_h is the technology coefficient matrix for the home (domestic) economy, A_m is the Import-Coefficient matrix for the domestic production. X_h, X_m are respectively the total domestic production and imports. The D_m, D are the demand met from by the imports and the total demand respectively.

From the above we can derive the following model.

$$\left[\begin{array}{c} X_h \\ \cdots \\ X_m \end{array} \right] = \left[\begin{array}{c|c} I & 0 \\ \hline \cdots & \cdots \\ 0 & I \end{array} \right] - \left[\begin{array}{c|c} A_h & 0 \\ \hline A_m & 0 \end{array} \right]^{-1} * \left[\begin{array}{c} D - D_m \\ \cdots \\ D_m \end{array} \right]$$

and further we get the following relationship

$$\left[\begin{array}{c} X_h \\ \cdots \\ X_m \end{array} \right] = \left[\begin{array}{c|c} (I_h - A) & 0 \\ \hline \cdots & \cdots \\ -A_m & I \end{array} \right] \left[\begin{array}{c} D - D_m \\ \cdots \\ D_m \end{array} \right]$$

which is in turn

$$= \left[\begin{array}{c|c} (I - A_h)^{-1} & 0 \\ \hline \cdots & \cdots \\ A_m(I - A_h)^{-1} & I \end{array} \right] \left[\begin{array}{c} D - D_m \\ \cdots \\ D_m \end{array} \right]$$

Thus we get

$$X_h = (I - A_h)^{-1}(D - D_m)$$

$$X_m = A_m(I - A_h)^{-1}(D - D_m) + D_m$$

$$= A_m * X_h + D_m$$

Therefore

$$D_m = X_m - A_m(I - A_h)^{-1}(D - D_m)$$

$$X_h = A_h * X_h + D - D_m$$

$$= A_h * X_h + D - (A_m * X_h - X_m)$$

$$\begin{aligned}
 &= A_h * X_h - A_m * X_h + D + X_m \\
 &= (I - A_h + A_m)^{-1} (D + X_m)
 \end{aligned}$$

In this model it is assumed that the technology can work in absence of imports, which may not be practicable. Similarly, the final demands may not be segregable, as the joint requirements of domestic and imported products are there in many cases. The above model was used by R. Stone (1970) and T.S. Barker (1974).

2.3.5 IMPORTS TREATED AS COMPETITIVE

In another model, the total imports were treated as competitive. This model has been used by many research workers including Bulmer Thomas (1979), Atul Sarma, Kewal Ram (1989) and others. The model is given as below-

The equations can be written as follows.

$$X_i = \sum X_{ij} + D_i - M_i$$

$$X_{ij} = a_{ij} * X_j$$

$$X_j^* = (I - A)^{-1} (D_i - M_i)$$

$$X^* = (I - A)^{-1} D$$

$$X = (I - A)^{-1} (D - M)$$

$$= X^* - (I - A)^{-1} M$$

$$\text{Or } (I - A)^{-1} M = X^* - X$$

$$m_i = M_j / X_j$$

$$X_i = \sum X_{ij} + D_i - m_i * X_i$$

$$X_i - \sum a_{ij} X_i + m_i X_i = D_i$$

$$X_i = (\hat{I} - A + M)^{-1} D_i$$

$$M = \hat{M} * X$$

$$= \hat{M} (I - A + M)^{-1} D$$

As stated by Lecomber (1970) that the assumption of proportionality stems from the assumption that there is little possibility of substitution from the home products. But the fixed proportion between competing imports and outputs may not hold in an economy like India, where most of the products can be produced albeit with some different cost and quality.

2.3.6 GONDOLFO'S FOREIGN TRADE MULTIPLIER

Gondolfo had developed a foreign trade multiplier as below-

$$\Delta Y = \frac{1}{1 - b - h + m} * \Delta E$$

here b = marginal propensity to consume;

h = marginal propensity to invest

m = marginal propensity to import

condition is that $h < (1 - b + m)$

therefore

$$\Delta M = m * \Delta Y = \frac{m}{1 - b - h + m} \Delta E$$

So for equality $\Delta E = \Delta Y$ (balanced trade)

Therefore $m / (1 - b - h + m) = 1$

so $h = 1 - b$

or marginal propensity to invest = marginal propensity to save.

But in this model the imports have been taken as leakages from the economy, while in practice in many situations, some of the imports work as complementary to the economy rather than as leakages from it. The production is also not automatic and it requires imports, investment and resources.

The above models have been used to study the impact of foreign trade on the economy in the Input-Output frame-work in the past. Most of these models have some limitations as mentioned above alongwith the description of the respective models. The Leontief model used for the study of capital-intensity vs labour intensity of the foreign trade of the American economy is considered to be the most appropriate. This model also takes into account the induced linkages of foreign trade in a semi-closed I-O frame-work.

2.4 OBJECTIVE AND EMPHASIS IN THIS STUDY

The main objective of this study is to analyse in as much disaggregation as possible, the effects of growth of different types of imports and exports over the years on the growth and structure of domestic production in India. It is proposed to estimate the real impact (net effect) of change in imports and exports of items in specific sectors both in positive and negative direction. It is desired to identify the sectors of critical importance for the economy for growth of production in the long run.

It is further the objective of this study to analyse in detail the impact of changes in imports and exports in specific industries in terms of income generation, employment in domestic economy, prices and income-distribution over the years. Thereby it is proposed to identify the sectors, in which income and employment may grow and others in which income and employment may suffer due to adverse effects of growing trade. It is proposed to identify the sectors, in which imports/exports affect the price level in the economy significantly.

The effect on income-distribution will be analysed in a semi-closed model with endogenised private consumption of different income-classes of consumers with net value added of the respective groups as row vector within the transaction matrix. It will help in taking into consideration the induced effects of the distribution of value added generated in the changed scenario of structure of production on the consumption of the concerned classes. Since the saving propensities of different classes are different, changes in distribution of factor shares may affect the induced effects in a significant way. This may provide the future growth potentiality in the economy in the event of change in factor shares in future ,in case of higher growth of foreign technology in the country.

Since the capital accumulation is a part of final demand, it is treated exogenously, but the capital formation affects the production in future as well as the exports and import scenario. Thus to take into account the dynamic effects of capital accumulation in different sectors, a dynamic model has been developed for use in the semi-closed Input-Output model with endogenised foreign trade.

2.4.1 SPECIAL EMPHASIS IN THE STUDY

In this study, the imports have been divided into competitive and complementary imports. This division is based on the importance of any item of import in the regular way over the years in a significant amount for the intermediate consumption. So the main importance is provided to the domestic production. The competitive imports within the transaction matrix have been segregated as these could be produced in the economy in the short run. The basic capability as well as capacity exist in the economy for such goods. The important feature is to treat the competitive imports only as leakages, because of the assumption of no change in production structure in the short run. In this way the real potential growth in production can be estimated, while simultaneously estimating the requirement of necessary (complementary) imports. The other imports i.e. those used for private consumption, government consumption and fixed capital formation are also proposed to be divided into the competitive and complementary imports. Separate estimation of loss of production due to different types of imports has to be estimated. So that appropriate policy guidelines may be provided for policy makers, such that specific policy could be adopted in case of exigencies.

For stimulus to different sectors due to imports, exports, the estimation of backward linkages is to be estimated by Demand model, while for estimation of forward linkages the Supply model is to be used, to provide appropriate measures of stimulus in all alternative situations. Thus rather than negative

impact of all imports, this study will be able to segregate the positive effects also in specific sectors due to certain types of imports in static, open, semi-closed as well as in dynamic models. Similarly it will be able to provide estimates of positive as well as negative stimulus to the economy in various sectors due to the exports on the same pattern in open, static, semi-closed, dynamic model.

2.5. MATHEMATICAL FRAME-WORK OF METHODOLOGY

Some models in the past have extended the proportionality assumption that 'industries purchase inputs in immutable proportions', to the foreign trade. The proposal was originally suggested by Leontief (1941) allowing foreign trade sector to be treated like the productive sectors. J.R.C.Lecomber (1970) states " Imports are everywhere proportional to the outputs of user industries, while the exports required to pay for these imports ,split among commodities in fixed proportions". Although some empirical studies confirm that substitution elasticities between imports and home production of similar products are generally high, however in case of India for some industries it is very limited. As already mentioned to earlier, the import price elasticities are low in developing countries, the proportion of some imports have tended to be same over the years in India. It has been analysed with the help of regression between various imports (items) and total imports, latter being taken as independent variable. It has been found that in case of many sectors, there are significant relations, with high R^2 's. This analysis has been carried for a significantly long period of about 25 years . Such items which are imported recurrently, over a long period, form a significant proportion of total imports and total supply in the country, which are not being produced or can not be produced economically in the required quantities in a short time span of about five years. It may be so due to either, capital or resource deficiency or due to lack of technology orinfrastructure. Such imports are defined as 'Complementary Imports'. The word complementary has been used in the sense that

such items complement the efforts of the domestic economy in further production as well as potential for further productive capacity generation for larger production in future. This word is preferred over the term 'non-competitive' since practically all the items, without the quality differentials, and size diversity can be produced domestically albeit with some amount of imports and knowhow in a course of time. The other items of imports are termed as 'Competitive', which are either used for final consumption or for intermediate consumption due to certain short-run fluctuations in production or due to intra-industry specialisation.

With the help of division of the imports used for inter-industry use and the final demand into that met with indigenous production, complementary and competitive imports, the real positive as well as negative impact of growth of different types of imports on different sectors can be analysed (T.S.Barker, 1972).

The model can be specified as below:-

$$m_1 + X = W_1 * i + h_d + h_1 + e \dots \dots \dots (2.24)$$

$$i' * m_2 = i' * W_2 * i + h_2 \dots \dots \dots (2.25)$$

here m_1, m_2 are competitive and complementary imports, h_d, h_1, h_2 are household demand, other final demand met from domestic production, competitive imports and complementary imports respectively, e being the exports. W_1 is the technology (transaction) matrix with domestic goods and competitive imports, W_2 is the import transaction matrix of complementary imports only.

The input-output equations can be written as :-

$$\begin{aligned}
 X + M &= (X_{11} + m_{11}) + (X_{12} + m_{12}) + \dots + (X_{in} + m_{in}) + F + e \\
 X + M &= (X_{21} + m_{21}) + (X_{22} + m_{22}) + \dots + (X_{2n} + m_{2n}) + F + e \\
 &\dots \\
 &\dots \\
 X + M &= (X_{n1} + m_{n1}) + (X_{n2} + m_{n2}) + \dots + (X_{nn} + m_{nn}) + F + e \\
 &\dots \quad (2.26)
 \end{aligned}$$

for $i, j = 1, 2, \dots, n$ sectors.

Here X_i is the total output in the economy in sector i , M_i is the total imports in sector i , e_i the total export, F_i is the total final demand excluding imports and exports in the sector i . X_{ij} is the output of sector i going into sector j for intermediate consumption, while m_{ij} is the import of industry i going for intermediate use in sector j .

The above system can be represented as below:-

$$\sum_{i=1}^n X_j + \sum_{j=1}^n M_k - \sum_{k=1}^m M_l - \sum_{l=1}^n e_i = \sum_{i=1}^n X_{ij} + \sum_{j=1}^m m_{kj} + \sum_{l=1}^L F_l \quad (2.27)$$

$$\sum_{k=1}^m M_k = \sum_{j=1}^m m_{kj} + \sum_{l=1}^L F_l \quad (2.28)$$

where k is index for complementary imports, l is the index for competitive imports.

Based on the above model, an $(n+1) * (n+1)$ system of equations can be developed, such that the complementary imports are subtracted from the transaction matrix and converted into a row vector. The final demand vector is also separated for complementary imports and others. The exports are taken as a column within the technology-coefficient matrix as below-

$$\left[\begin{array}{ccc|c} I - A & -b \\ \hline -d & 1 \end{array} \right] \left[\begin{array}{c} X \\ \hline e \end{array} \right] + \left[\begin{array}{c} m_f \\ \hline -1 \end{array} \right] Z = \left[\begin{array}{c} r \\ \hline r_d \end{array} \right] \quad (2.29)$$

where X is the vector of outputs, m , the vector of import-coefficients, e , total exports, Z the total value of imports used for final demands, and d is the row of complementary import-coefficients (with total imports). A being the technology-coefficient matrix, such that for output in sector j , total output in the economy for the industry j is used as denominator.

b = column of export-coefficients (out of total exports)

m = column of competitive import-coefficients used for f final demand (out of total imports)

r = column of residual final demand (other than imports and exports)

r = part of complementary imports used for final demands.

d

In alternative matrix notations it can be expressed as below:

Let $A = ((a_{ij}))$, where $a_{ij} = x_{ij} / x_j$, where x_{ij} is the transaction from i th production sector to j th and x_j is the total output in the j th sector, so the basic system may be put as follows :

$$A_{pp} * X_p + A_{pe} * X_e + r = X_p \dots \dots \dots (2.30)$$

$$A_{mp} * X_p + r_d = X_e \dots \dots \dots (2.31)$$

where p denotes production sector, m the complementary imports, e the exports. For A_{pe} the denominator is total value of exports, X_e and not X_m , the total value of complementary imports. Though there may be difference between X_m , X_e , this difference has been considered as insignificant.

The expanded inter-industry coefficient matrix in partitioned form can be defined as below:

$$\begin{bmatrix} A_{pp} & A_{pe} \\ A_{mp} & 0 \end{bmatrix}$$

The above system is quite similar to the Leontief model (1956) used for analysing the American foreign trade. In the above model, the complementary imports (used for intermediate consumption of the firms) and exports are endogenised while the competitive imports (for all use) as well as complementary imports (for final use) have been treated as exogenous. The exogenous variables can be changed in the economy without much change in the structure of production in direct way and in technology.

Richard Stone (1968) had said that " greater flexibility may be achieved by classifying all imports by commodity type, at the same time distinguishing special commodity-groups to accommodate products not produced in significant quantities at home ". Further he stated that this treatment has since been agreed internationally. Also, it is not considered satisfactory to arbitrarily balance the foreign trade in the model as on year to year basis, it may never match (Lecomber, 1970). In case of India, there has been long term imbalance, which was taken care of by surplus on invisibles' account. Therefore in this study, the unbalanced foreign trade has been endogenised. A.K.Sengupta, A.Ghosh (1979) had similarly endogenised the private consumption from the final demand and net value added from the primary inputs to estimate the induced effects on income distribution in the economy in an unbalanced way.

The above model can be used for estimating the direct, indirect and induced linkages of foreign trade. Since the exports are (n+1)th using sector, the backward linkages for the (n+1)th sector, will be for the exports. Similarly the forward linkages due to the complementary imports can be estimated through the forward linkages for the (n+1) th sector. The formulae for backward, and forward linkages are presented in chapter 4.

2.5.1 LOSS OF POTENTIAL OUTPUT

The effects of competitive imports can be estimated on the basis of partitioned matrix approach, since all the competitive imports can be assumed to be leakages. It can be estimated as loss of production, derived as follows:-

$$X_i = (I - A + M)^{-1} D \quad \dots \quad (2.32)$$

where M is the import transaction matrix including only competitive imports and D_1 is the final demand vector. Such loss can be estimated separately for different vectors in the intermediate use for competitive imports and for final demand, e.g. private consumption, government consumption and capital formation. Besides the net domestic multiplier and production can be estimated in different sectors. The loss of potential production in the individual sectors can be estimated with the help of above model for imports (separately for competitive and complementary) for intermediate use and for different types of final demand. Thus it can help in estimating the loss of production due to a particular type of import for a specific sector to meet a particular category of final demand, say private consumption, government consumption or capital formation. It may help in providing specific policy guidelines for growth of production of specific goods in the economy.

2.6 Measuring Factors of Growth in Output

Decomposition of each sector's output into that caused by various factors can be done by various methods in Input-Output frame-work (e.g. Chenery, 1960, 1980 ; Torii & Fukesaka, 1987 ; Bulmer Thomas, 1982 , Chenery et al., 1986). Syrquin 's method (1976) based on Chenery's decomposition method is appropriate to evaluate the effects of exports and import -substitution.

In this method, the basic relationship for the open Leontief system in period t can be written as follows.

Here X, F,E,M and A are the vectors of output, domestic final demand, exports, imports and input-output coefficient matrix. From this we can derive the following.

$$M_t = (I_t - \langle U_t \rangle) (A_t X_t + F_t) \dots \dots \dots \dots (2.34)$$

Here U and $\langle \cdot \rangle$ denote a self-sufficiency ratio vector and an operator to create a diagonal matrix from a vector, respectively. Then by assuming X_t and M_t as endogenous variables,

the following solution can be derived:

By using the equation (2.35) above, the output vector for period ($t+1$) can be written as follows.

$$X_{t+1} = R_{t+1} \left(<U_{t+1}> F_{t+1} + E_{t+1} \right) \dots \dots \dots \quad (2.37)$$

Then by using the above equation (2.35) and (2.37) , the growth in output (dX) can be expressed in terms of increase in internal and external demand (dF) and (dE) and changes in two sets of parameters (dU) and (dA) as follows.

$$dX = R_t <U_t> dF + R_t dE + R_t <dU> Y_{t+1} +$$

$$R_t <U_t> dA X_{t+1} \dots \dots \dots \quad (2.38)$$

$$\text{where } Y = A X + F$$

The four terms on the right hand side of the equation(2.38) above can be interpreted as follows.

(a) Domestic Final Demand Expansion Effect (FD Effect)

The ith element of the first term captures the effect of the expansion of domestic final demand in all sectors on the output growth of sector i;

(b) Export Expansion Effect (EE Effect)

The ith element of the second term captures the effect of the expansion of exports in all sectors on the output growth of sector i;

(c)Import-Substitution (IS effect)

The ith element of the third term captures the effect of the increase of self-sufficiency ratio in all sectors on the output growth of sector i.Syrquin interpreted this as the effect

induced by import-substitution;

(d) Technology Change Effect (TC Effect)

The i th element of the fourth term captures the effect of the increase of input-coefficients in all sectors on the output growth of sector i . In other words, this is the ' demand side ' effect on the output growth in sector i of the technology change in all sectors.

The growth pattern of various sectors can be assessed by comparing the size and direction of these four effects. If the growth in output in a given sector can be largely explained by the EE effect, then its growth pattern can be said to be of the Export-led type. Similarly, if in a sector, the growth can be largely explained by the IS effect, then the sector's growth pattern is of the Import-Substitution type.

2.7 Measuring Factors of Employment Growth

The employment induced by domestic final demand and exports for period ($t+1$) can be written as follows.

$$W_{t+1} = \langle L_{t+1} \rangle R_{t+1} (\langle U_{t+1} \rangle F_{t+1} + E_{t+1}) \dots \dots \quad (2.39)$$

Thus by using this equation , the decomposition as below with respect to employment growth can be derived.

$$dW = \langle dL \rangle X_{t+1} + \langle L_t \rangle R_t \langle U_t \rangle dF + \langle L_t \rangle R_t dE + \langle L_t \rangle R_t \langle dU \rangle Y_{t+1} + \langle L_t \rangle R_t \langle U_t \rangle dA_X_{t+1}$$

..... (2.40)

The first term on the right -hand side of equation measures the effects of changes in labour productivity on employment growth, which we term as LP effect. If there is an increase in labour productivity, employment growth is negatively affected; on the other hand , a decline in labour -productivity shows a positive LP effect on employment growth.

The factors of growth in income generation in various sectors can be estimated in an analogous manner.

2.7.1 Measuring Employment Effects of Exports

The employment W directly and indirectly created by exports can be measured as follows.

$$\frac{W}{t} = \langle L \rangle R E \quad \dots \dots \dots \quad (2.41)$$

where L denotes an Employment- Output Coefficient Vector.

2.7.2 Measuring Sources of Export Expansion Effect

The EE effect of sector i captures the effect of the expansion of exports in 'all' sectors (i.e. sector i as well as the other sectors) on the growth of output of sector i .The EE effect by source of the change in exports can be measured by using the following method.

$$R_t \frac{dE}{t} = \begin{bmatrix} dE_1 & 0 & \dots & \dots & 0 \\ 0 & dE_2 & \dots & \dots & 0 \\ 0 & 0 & \dots & \dots & 0 \\ \cdot & \cdot & & & \cdot \\ 0 & 0 & \dots & \dots & dE_n \end{bmatrix} \quad (2.42)$$

where $(e_1, e_2, e_3, \dots, e_n) = E$. The j th element of the i th item indicates the effect of the Export Expansion of sector i for the output growth of sector j .

2.8 Dynamic Model

Input-Output model can be used for projection of output in the future period. The dynamic model can help in finding out the structure of production in future with the help of a capital-coefficient matrix. It can also help in predicting the likely growth rate in the various sectors of the economy.

When we have B , a matrix of (b_{ij}) , the fixed capital coefficients for deliveries of additional fixed assets required to unit growth in output in i th sector, then the model can be specified as below.

$$\frac{A}{pp} * \frac{x}{p} + \frac{A}{pe} * \frac{x}{e} + \frac{B}{p} * \frac{x}{p} = \frac{x}{p} \dots \dots \dots (2.43)$$

$$\frac{A}{mp} * \frac{x}{p} = \frac{x}{e} \dots \dots \dots (2.44)$$

Based on the above model x_p, x_m, x_e can be derived in terms of each other. Since the B matrix consists of deliveries of capital goods from different sectors, only a few of which produce significant amount of capital goods, B matrix is singular, as it is only of order 9 by 46 in this study. Alternatively the model can be specified as below.

$$(I - A) X = R + <g> B X \dots \dots \dots (2.45) \text{ or}$$

$$X = (I - A - <g> B) R \dots \dots (2.46)$$

or

$$X_i = (I - A - \langle g_i \rangle B)^{-1} R_i \dots (2.47)$$

Here R , B , $\langle g \rangle$ are the final consumption vector, capital coefficient matrix and the diagonal matrix of rate of growth. In the normal model g is taken as fixed for the whole economy, however in this study the growth vector has been considered based on the growth targets in production of various sectors, which is specific and much more easy to assume. It can also be monitored more easily.

Appendix -III

**Treatment of Foreign Trade in Selected Input-Output Models
for medium term Projection and Planning in Market Economies**

Category	Reference	No. of Prodn. Sectors	Special features
(1)	(2)	(3)	(4)
1.Belgium	Paulinck,J. (1965) Le La Modela econometri- qued'exploration utilise' par le Bureau de Programma- tion Economique Belge in (ed.) Parenti.Mod- elli Econometrie per la Programmazione Florence.	14	
2. Egypt	Eleish,G. (1963) The input-output mod- el in a developing economy: Egypt in (ed.) Barna,Struct- ural Interdependence and economic develop- ment. Macmillan,London.	33	
3.France	Nataf, A. (1965) Variante marginale d'un plan: Problemes d'adjustment.in (ed.) Parenti,Modelli econometrie per le Programmazione. Florence.	12	Programming
4.India	Manne,A.S.(1964) Studies in the struc- ture of the Indian economy.Report No.1. A consistency model of India's 4th plan, M.I.T.Center for International studies	30	
5.Ireland (1)	Greary,R.C.(1965) Towards an input- output decision model for Ireland.Proce- edings of the Statis- tical and Social Inq- uiry Society for Ire- land,XXI 2.	16	
6.Ireland (2)	Simpson,D.(1968) A Medium-term planning	16	Programming

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 (Continued)
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Country (1)	Balance of Payments (5)	Treatment of Exports (6)	Division of Imports into comp./compl. (7)	Treatment of competitive imports (8)
1.Belgium	Balanced by ad hoc adjustments	Exogenous	Yes	Proportional to demands
2.Egypt	Not balanced	Exogenous	No	All industrial
3.France	Yes	Exogenous	Yes	Exogenous
4.India	Ad hoc adjustment to import coefficients	Exogenous	No	Some exogenous. All other Industrial imports
5.Ireland(1)	Balanced	Fixed proportion of total	No	All industrial inputs proportional to user outputs
6.Ireland(2)	Balanced	Free to vary between exogenous bounds	Yes	Exogenous

Appendix - III
 (Continued)
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Category	Role of Prices	Determination of Prices
(1)	(9)	(10)
1.Belgium	1. Construction of Primary input current price prices matrix Exogenous $p = p_m = P$ 2.Explanatory vari- in consumption function	
2. Egypt	None	-
3.France	-	Shadow prices derived
4.India	None	-
5.Ireland (1)	None	-
6.Ireland (2)	-	Shadow prices derived

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(1)	(2)	(3)	(4)
7. Isreal	Bruno, M. (1963) Some applications of input-output techniques. In (ed.) Barna; Structural Interdependence and economic development. Macmillan, London.	20	
8. Italy	Chenery, H.B., P. Clark and V. Cao Pinna (1953) The structure and growth of the Italian economy, USA Mutual Security Agency	56	
9. Netherlands	Sandee, J. (1965) An experimental phased sector model for the Netherlands. In (ed.;) Parenti, Modelli econometrie per la programmazione Florence.	71	Programming Multi-year
10. New Zealand	Blyth, C.A. and G.A. Crothall (1965) A Pilot programming model of the New Zealand economic development. Econometrica.	7*	Programming
11. Norway	Per Sevaldsen (1964) 129 An inter-industry model of production and consumption for economic planning in Norway. In (ed.) Clarke and Stuvel, income redistribution and the statistical foundations of economy policy. International Association for research in Income and Wealth, Series X.	129	

* Of the seven sectors distinguished, three (oil, agriculture, air transport) are treated as exogenous

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(Continued)
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(1)	(5)	(6)	(7)	(8)
7.Isreal	Not balanced	Exogenous	No	All industrial imports proportional to user outputs
8.Italy	Not balanced	Exogenous	No	Linear relationships between imports and demands by product group, capacity constraints introduced
9.Netherlands	Balanced	Free to vary	No	All imports proportional to industry outputs or final demands, total imports adjusted with price of services
10.New Zealand	Balanced	Fixed proportions of total	No	All Industrial imports proportional to user outputs
11.Norway	Not balanced	Exogenous	No	All industrial imports proportional to user outputs

Appendix -III
(Continued)
page -2

	(1)	(9)	(10)
7. Isreal	None	-	
8. Italy	None	-	
9. Netherlands	Only one price introduced (service s) Included in equations. Free to vary to achieve optimum.		
10. New Zealand	-	Shadow prices derived	
11. Norway	1. Conversion between current and constant prices	Exogenous ?	
	2. Explanatory variables for consumers' expenditure		

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(1)	(2)	(3)	(4)
12.U.K. (1)	Cambridge, Department of Applied Economics (1965) Exploring 1970. Some numerical results.Vol. 6 in A Programme for Growth, Chapman & Hall.	31	Earlier Version of present model. Used for national plan
13.U.K. (2)	Cambridge, Department of Applied Economics (forthcoming) Exploring 1972,with special emphasis on the balance of payments. Vol.10 in A Programme for Growth, Chapman & Hall.	35	
14.U.S. (1)	Leontief,W.W. and M. Hoffenberg (1961) The economic effects of disarmament. Scientific American. Reprinted in W.W.Leontief Input-output Economics. O.U.P. New York,1965.	20	
15.U.S. (2)	Almon,C.(jr.) (1966) The American economy in 1975. An inter-industry forecast. Harper & Row,New York.	90	Dynamic
16.U.S. (3)	Isard,W. (1951) Inter-regional and regional input-output. A model of a spare economy.Review of Economics and Statistics	20 in each of 3 regions	
17.World	Group d'Etudes Prospectives sur les Echanges Internationaux (1967) Equations of GEPEI model (mimeo).	13 in each of 3 regions	

comp.imports = Competitive Imports ,
 Compl. Imports = Complementary Imports

Appendix -III
(Continued)
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(1)	(5)	(6)	(7)	(8)
12.U.K. (1)	Balanced (at cons- tant prices)	Exogenous	Yes	Linear function of total comp. imports (set by balance of payments con- straints)
13.U.K. (2)	Balanced	Functions of Prices	No	All imports functions of demand and prices
14.U.S. (1)	Not balanced	Exogenous	No	All industrial imports pro- portional to user outputs
15.U.S. (2)	Not balanced	Exogenous	Yes	Exogenous
16.U.S. (3)	Not balanced	Endogenous via foreign trade multiplier	No	All industrial imports propor- tional to user outputs
17.World	Not balanced	Trade flows calculated on assumption of fixe import-output coefficients, adjusted in respo to (1) relative prices in exporting and impo country, (2) proxy for sales effort, (3) size exporting industry relative to world		

Appendix - III
(Continued)
page-3

(1) (9) (10)

12.U.K. (1) Determinants of Exogenous
Consumers' expenditures

13.U.K. (2) 1.Foreign trade Input-Output
functions dual
2.Consumers' expenditure
functions
3.Valuation of
balance of
payments

14.U.S. (1) None -

15.U.S. (2) None -

16.U.S. (3) None -

17.World Determinants of Exogenous
trade flows

CHAPTER 3

DATA BASE

3.1 Introduction

In this chapter we have explained in detail, the various sources of data collected for the study, their special characteristics, limitations and vintage. The method applied to make various data comparable and applicable to the present study is also presented in detail. The basic data for this study consisted of Input-Output Tables, Import-Transaction and Import-Coefficient Matrices, Capital-Coefficient Matrix , Employment Vector and Price indices and other related data. While the Input-Output tables, Import-Transaction (Coefficient) Matrices were used as were available with some modifications and adjustments, the Capital-Coefficient matrix was constructed by a detailed method specially for this study, as the similar table with required disaggregation for the current period is not available in the country. Other data were collected on capital formation, capital consumption (depreciation) over a long period of time for various industries .The data relating to prices, employment and some other entities were also used with some modifications. The data available from different sources are presented in the following paragraphs.

The next section discusses the form of Input-Output tables as available from the source and the modifications done to make these comparable with the underlying assumptions. The third section discusses the Import-Coefficient (Transaction) Matrices

and how these were modified and applied in the study. As the present study divides the imports into competitive and complementary, the Import-Transaction matrices are also divided into two. The method of modification used is also described in this section. The fourth section describes the basic sources of data to construct the capital-coefficient matrix at the detailed sector level. As no appropriate capital-coefficient data are available in India at the level of Input-Output table classification (sectorisation) , the estimates of Gross Fixed Capital Stock and Capital Consumption have been estimated by using the Perpetual Inventory Method (PIM) suggested by the UN Statistical Office, New York. It has been done at 2-3/4 digit level of National Industrial Classification (NIC) as became necessary for a particular sector as used in Input-Output Table.

The fifth section describes the other data sources, e.g., for prices, implicit value indices, implicit unit value indices, employment in various sectors, income-distribution, factor incomes, average life of fixed assets, methodology of estimation of fixed capital stock. The various methods used to modify these data are also explained in this section. This section also describes the other adjustments made while applying the methodology to the data.

3.2 Description and Sources of Input-Output Tables

The basic Indian Input-Output Tables (IOTT's) can be considered as open, static Leontief type (demand driven) table. The first official Indian Input-Output (I-O) table was prepared jointly by the Central Statistical Organisation (

C.S.O.) and Planning Commission of India. This was consistent with the National Accounts Statistics (NAS). Later on C.S.O. undertook the responsibility to prepare the I-O tables from the year 1973-74 onwards on a quinquennial basis. C.S.O. thus prepared tables for the years 1973-74, 1978-79 and 1983-84 so far. However, CSO do not prepare any Import-Transaction or Import-Coefficient matrix consistent with the I-O sectorisation, while Planning Commission uses the I-O tables prepared by the CSO to update and prepare modified set of I-O tables for the base year of every Five Year Plan (FYP). It also projects and prepares a projected I-O table for the end-year of the concerned Five Year Plan. Planning Commission in addition prepares and publishes regularly (corresponding to every FYP) the Import-Transaction (Coefficient) matrices. Therefore the I-O tables prepared by the Planning Commission for the years 1979-80, 1984-85, 1989-90, 1991-92 and that projected table for the year 1996-97 form the main source of data for the purpose of this study. These tables have been considered suitable for this study because the trade liberalisation policy was taken up since the early eighties in India in a gradual way (from 1985 in a significant way) and afterwards in 1991 the trade was very greatly liberalised. In fact each of these period marked a significant change over the previous period in the area of foreign trade.

The basic I-O Transactions tables for these reference years are in the form of absorption (Commodity * Industry) matrices at current factor cost where the rows represent group of commodities and the columns, the group of industries, showing the use of various commodities as inputs in production process of

corresponding industries. Each row gives the commodity inputs of raw materials and services which result in the outputs of the particular industries. The rows in the final use part give the use of commodities used by final users e.g. private households, government, investment, foreign trade. The total output in a row ,thus represents the total use of a commodity in intermediate use and final use, which is equal to total output of that commodity in the economy, net of imports. The column entries at the bottom of the table (quarter III) give the primary inputs for various production sectors in terms of value added from use of labour, capital and net indirect taxes (i.e. indirect taxes less subsidies).

As the rows and columns represent different entities, because industries use different commodities for inputs and produce main product and some by-products,which may be main product of some other industry, the row-totals do not tally with the column-totals. In Commodity by Industry table, while determining the entries in the rows, a by-product (Secondary product) of an industry is transferred to the sector (Commodity row) whose principal product is the same as the by-product under reference. The columns of the commodity by Industry table, however, show the total of the main product and by-products of each industry (CSO,1990).Therefore row-totals do not match with the column-totals.

The Make Matrix (Industry by Commodity) on the other hand represents the distribution of the production of an industry into commodities, which are the main products of various industries.This is in the form of inter-industry table only and

no final demands are given for this. The coefficient matrix of this table is prepared with the help of proportions of production of an industry into commodities produced as the main products of various industries. These two tables ,Absorption Matrix and Make Matrix are used to prepare a Commodity by Commodity Matrix under some assumptions. In this study the output of an industry in the form of by-products produced in an industry have been allocated to the industry,where they are primarily produced by method of allocation under the Industry - by - Technology assumption.The by-products of any industry can be allocated by two assumptions,viz.

- (a) Industry-Technology Assumption Method; and
- (b) Commodity-Technology Assumption method.

Under the Industry-Technology assumption the input structure of a by-product is considered to be similar to the industry where it has been produced,while under the Commodity-Technology assumption the input-structure of the secondary products of an industry is assumed to be similar to that industry where that item is mainly produced.In a Commodity by Commodity table both rows and columns represent the commodity-group sectors.Thus if the secondary products of an industry group along-with the inputs are transferred to the industry group where they are the main (principal) products, the resulting table is a Commodity by Commodity table under Industry - Technology assumption. For all the years under reference except 1996-97, the Make Matrices are available and, the Commodity * Commodity tables have been prepared under the Industrt-Technology assumption. For the year 1996-97, the Make matrix has been assumed to be similar to that for the year 1991-92 and based on that the Commodity by

Sectorisation of the Indian Economy

Annexure 3.1

S.No.

Production Sector

Foodgrains

1. Fibre Crops (Cotton & Jute)

2. Plantation Crops (Tea & Cooffee)

3. Other Crops

4. Animal Husbandry

5. Forestry & Logging

6. Fishing

7. Coal & Lignite

8. *Crude Petroleum & Natural Gas

9. Iron Ore

10.

11. *Other Metallic, non-metallic and minor minerals

12. Sugar

13. Khandsari , Gur and Boora

14. Other Food and Beverage Industries

15. Cotton Textiles

16. Art Silk & Synthetic Textiles

17. Woollen Textiles

18. Other Textiles

19. Wood and Wood Products

20. *Paper and Paper based Industries

21. Leather and leather based Industries

22. Rubber Products

23. Plastics

24. *Petroleum Products

25. Coal Tar Products

26. *Fertilisers

27. *Pesticides

28. Synthetic Fibre & Resin

29. *Other Chemicals

30. Cement

31. *Other Non-Metallic Mineral Products

32. *Iron & Steel

33. *Non-Ferrous Metals

34. *Non-Electric Machinery

35. *Electric Machinery

36. Rail Equipments

37. Motor Vehicles

38. *Other Transport Equipments

39. Communication & Electronic Equipments

40. *Other Manufacturing

41. Rail Transport Service

42. Other Transport Service

43. Electricity

Construction

44. Communication

45. Other Services

* Sectors treated as Complementary for the purpose of Imports

Commodity table has been derived under the similar assumption.

Since the basic purpose of this study is to analyse the effects of foreign trade on the structure of production and thereby on other aggregates , the Commodity * Commodity table reflects the technology of production in an appropriate manner both from the supply as well as demand sides.Further the basic equation of Input-Output theory i. e.

$$X = (I - A)^{-1} * F$$

holds only in the case of pure tables like the one specified by a Commodity by Commodity table.

The Input-Output tables presented by the Planning Commission of India for various plan-periods follow different sectorisation pattern. While the tables for 1979-80 had 89 -sector pattern, that of 1984-85 had 50 -sector classification.The same for 1989-90, 1991-92 and 1996-97 follow 60 by 60 -sector classification pattern. Since, there was wide difference in the sectorisation, besides, the information on employment and prices are not available for very detailed classification,all the tables were aggregated into a common 46 -sector classification (given in table 3.1) The detail contents of various sectors can be seen in the Annexure-32. This sectorisation is quite useful to analyse the policy changes in foreign trade, because most of the major items and industries involved in foreign trade are easily distinguished in this classification.

The final demand in all the tables has been provided under six categories viz.

- (i) Private Final Consumption Expenditure (PFCE);
- (ii) Government Final Consumption Expenditure (GFCE);
- (iii) Gross Fixed Capital Formation (GFCF);
- (iv) Change in Stocks (CIS);
- (v) Exports (EXP); and
- (vi) Imports (IMP).

The PFCE represents the final consumption of the households and the non-profit institutions. The CIS includes the changes in the stocks of finished goods, semi-finished goods, raw materials, the parts of the output of producing sectors, hence these are free of trade, transport margins and indirect taxes. Exports have been taken as demands of domestic products by other countries and valued at free on board (f.o.b.) prices. The Imports are taken at the cost insurance and freight (c.i.f.) values and are presented in final demand as negative entries.

All the entries in the basic I-O tables are at current factor cost, i.e. excluding trade and transport charges and net of indirect taxes. The entries at factor cost were arrived after the components of trade and transport margins and net indirect taxes (which are also presented in the publications) are removed from the transactions at the original purchase prices. The row of the net indirect taxes depicts the taxes paid by the industries on intermediate inputs used in the process of production. The matrix of net indirect taxes is obtained by adding the various taxes e.g. import duties, excise duties, export duties, sales tax and other taxes and after subtracting the subsidies.

For the final demands, the proportion of imported goods and services for private consumption, government consumption and fixed investment are separately available. With the help of these, the use of imports for intermediate use has been obtained by subtraction from the total imports, sector-wise. It is assumed that no imports are kept as inventories.

3.3 Import-Transaction (Coefficient) Matrices

The Import-Transaction (Coefficient) matrices are available in the form of Commodity by Industry tables for all the periods in the classification of sectors as in the basic Input-Output tables for the corresponding periods i.e. 89 * 89 for 1973-74, 50 by 50 for 1984-85 and in 60 by 60 for the remaining periods. All these tables were brought to similar sectorisation ie. 46 by 46 as in case of the basic tables. Out of these 46 sectors, 14 sectors have been considered to be Complementary sectors for the purpose of imports. Therefore, all the tables were divided into two mutually exclusive tables of 46 by 46 representing the rows of the alternative type of sectors by zeroes for competitive and complementary imports respectively. The column totals of the matrix of complementary imports was obtained and used as a row vector in the basic Input-Output table for analysis of induced effects under semi-closed model, while corresponding column was taken from exports. The Import-Coefficient matrix consisting of complementary imports only was subtracted from the basic Commodity * Industry matrix for the corresponding year for analysis in the semi-closed model, and then the Commodity by Commodity matrix was obtained with the help

of respective Make matrices. For estimating the leakages in production due to the competitive imports, the Competitive imports were further subtracted from the basic Commodity by Industry matrix to obtain the derived Commodity by Industry matrix for the domestic share in the production structure for the corresponding years.

All the matrices were first obtained in the form of Transaction matrices and later the Coefficient matrices were obtained separately for demand driven (Leontief type) model and the Supply driven (Ghosh type) model using appropriate divisors.

3.4 Capital-Coefficient Matrix

For preparing the capital-coefficient matrix, the data on book value of net fixed assets, Gross Fixed Capital Formation (GFCF) at two and three digit level of National Industrial Classification (NIC) was taken from the " India Data Base " by H.L Chondhok, for the period 1970-71 to 1985-86. For the remaining years, the same was obtained from the summary reports of the Annual Survey of Industries (ASI). The similar information for four digit level of NIC for Net Book Value of Fixed Assets with break-up into Land, Land-Improvements, Buildings, Plant & Machinery, Transport Equipments and Tools and Other Equipments besides the assets under construction were obtained from the ASI detailed reports for the years 1973-74, 1978-79 and 1983-84.

The data for the Small Scale Industries (SSI) was obtained from the first and second Censuses of SSI's by the

Development Commissioner of Small Scale Industries (DCSSI) from respective reports at 2-digit level of NIC. The data on GFCF for various service sectors not covered under ASI was obtained with break-up into Construction and Machinery from various issues of National Accounts Statistics (NAS) from CSO.

For data on Average Life of Fixed Assets in various industries a set of three detailed proformae were convessed in various Research & Development (R & D) centres of various industries dealing with related sectors. The information on average age was collected from some while further detailed discussions were held with some technical representatives and industry-experts. For some industries, the information was taken from the " Estimates of Fixed Capital Stocks of India, CSO (1988) ". The age-distribution of Fixed Assets at different points of time was obtained for some industries from Chaturvedi and Bagchi (1984). The estimates of Gross Fixed Assets at 2 digit level of NIC for some of the industries was obtained from Dadi and Hashim (1973) for the period 1960 and 1964 for base year values. The procedure of Perpetual Inventory Method (PIM) devised by the United Nations Statistical Office (UNSO) for estimation of Gross Fixed Capital Stock (GFCS) and Consumption of Fixed Capital (CFC) as per the " UN Guidelines for Estimation of National Wealth, 1977 " and as applied for similar purpose by CSO (CSO, 1988) has been applied.

3.5 Other Sources of Data and Adjustments

The other data which were utilised for this study include data on employment, prices, other indices, factor income distribution, income distribution from the value added generated in various sectors into income-groups and distribution of various commodities into income-groups of households for final consumption etc. For data on employment, the information about sector-wise employment at 3-digit level of National Industrial Classification (NIC) was obtained from the reports of National Sample Survey Organisation (NSSO) 32nd round survey(for the year 1977-78) , 38th round (for the year 1983) survey and 43rd round survey (for the year 1988). For the latest information about employment at the main activity level 1 of NIC the information as available from 1991 census was used with the break-up as available from the 43rd round survey of NSSO. The estimates for the mid-year of the years 1979-80, 1984-85, 1989-90, 1991-92 were prepared based on interpolation and extrapolation method with the help of available data for three points of time as described above. Since the employment data are not available on the pattern of employment-industry matrix , a vector of Labour- Output Coefficient for each year 1979-80, 1984-85, 1989-90 and 1991-92 was derived with the help of sector-wise employment and total sectoral output for the respective years. For some sectors , the information on employment was required at four digit level of NIC e.g.Cement, for such sectors the division of employment was done on the basis of corresponding ratio in employment obtained from latest detailed ASI results (Item-wise) .

The next important data are price-data, which were required for inflating/deflating all the Input-Output tables, Import-Transaction matrices to a common time period, for estimating the Fixed Capital Stocks at constant prices by the PIM and the Gross Value Added (GVA) etc. The information on Whole-sale Price Indices was obtained for various years at the detail-item level from the " India Data Base ", Centre for Monitoring the Indian Economy (CMIE) publications regarding Economic Adviser's Whole-Sale Price Indices (WPI). For various service sectors, the implicit deflator for estimating the GVA at constant prices in CSO has been used, which was derived from various issues of the NAS for the relevant years. Since the price indices for intermediate consumption do not vary at the similar rate as those for the private consumption or the investment, separate price indices/ implicit deflators were used for converting the intermediate consumption, final demands for the same commodities as follows.

(i) For intermediate consumption	Economic Adviser's of various goods and services	Wholesale Price Index
(ii) For Private Consumption		C.S.O.'s Commodity-wise implicit deflator
(iii) For Fixed Capital Formation		- do -
(iv) For Govt. Consumption		- do -
(v) For Change in Stock		- do -
(vi) For Indirect Taxes		- do -
(vii) For Gross Value Added		- do -
(viii) For Imports		DGCIS' Unit Value Index of imports
(ix) For Exports		DGCIS' Unit Value Index of Exports

For the items which were imported in significant proportions, the weighted index of whole-sale and Unit Value Index of Imports was used to bring the prices at the comparable level e.g. crude petroleum, fertilisers etc. For bringing the GVA in the primary inputs to the constant (1984-85) prices, the implicit price deflator for GVA as applied by CSO in NAS was used for various sectors as available in disaggregated statements for different years. The conversion of Net Indirect Taxes (NIT) to constant prices was done as a residual after converting all the other entities and the totals. Firstly all the values in the inter-industry transaction matrix were converted to constant prices by the use of various indices as given above, then all the values in the final demand vectors were converted to constant prices with the help of appropriate indices as mentioned above. Thus the value of Gross Output was evaluated at constant prices. By using the Gross Output at constant prices, the intermediate supply to various sectors and the GVA, the NIT were estimated at constant prices as remainder.

The whole matrix of Import-Transactions was converted to constant prices with the help of Unit Value Index of Imports as available from the Directorate General of Commercial Intelligence and Statistics (DGCIS). The year for common price level chosen was 1984-85 for all the periods and for all the entities. For converting the price level of some specific categories, which are based on weighted indices of many items of goods, services e.g. Construction, Buildings etc, the cost of construction index and cost of building index made by commodity flow method in CSO were used.

The data on factor incomes were obtained from CSO's NAS for various years and "India Data Base (1990)", while the break-up of income- distribution for various sectors out of the Net Value Added (NVA) generated in the respective sectors was utilised as given in the book " Income Distribution and Basic Needs in India" by R.Sinha et al (1979). This information pertained to the year 1967-68, however since no similar information was available for any later year than 1967-68, the same information was used with some modifications in some sectors based on the later information for few industries in organised secondary sector. For distribution of income generated in agricultural and other activities in the rural areas , use of the report of NCAER (1975) was also made.

The distribution of consumption by households in different income-groups was obtained for the year 1988-89 from the National Sample Survey Organisation (NSSO) 44th round report of " Sarvekshana ", 1990. It was available separately for rural and urban areas, which was averaged with the help of respective proportions of population. The income-distribution for rural and urban areas by industry-groups was obtained for the years 1970-71, 1980-81 from NAS, 1993 of the CSO.

Although every effort has been made to make the price comparable for all the tables meant for different time-periods, still some incomparability might have been left in the tables. Besides, the information on Unit Value Indices of Imports and Exports were available at broad item level, which was not so appropriate to convert the prices in some sectors. Still in such

statistical exercises certain incomparability can not be ruled out. Therefore the results of this study may be considered with due acknowledgement of such inconsistencies, incompatibility and incomparability as might have been left in these tables , matrices and other data.

Detailed Sectorisation of the Indian

Sector Number	Production Sector
1.	Foodgrains
2.	Fibre Crops (Cotton & Jute)
3.	Plantation Crops (Tea & Cooffee)
4.	Other Crops
5.	Animal Husbandry
6.	Forestry & Logging
7.	Fishing
8.	Coal & Lignite
9.	*Crude Petroleum & Natural Gas
10.	Iron Ore
11.	*Other Metallic,non-metallic and minor minerals
12.	Sugar
13.	Khandsari ,Gur and Boora
14.	Other Food and Beverage Industries
15.	Cotton Textiles
16.	Art Silk & Synthetic Textiles
17.	Woollen Textiles
18.	Other Textiles
19.	Wood and Wood Products
20.	*Paper and Paper based Industries
21.	Leather and leather based Industries
22.	Rubber Products
23.	Plastics
24.	*Petroleum Products
25.	Coal Tar Products
26.	*Fertilisers
27.	*Pesticides
28.	Synthetic Fibre & Resin
29.	*Other Chemicals
30.	Cement
31.	*Other Non-Metallic Mineral Products
32.	*Iron & Steel
33.	*Non-Ferrous Metals
34.	*Non-Electric Machinery
	*
35.	*Electric Machinery
36.	Rail Equipments

Economy

Sector Contents

Paddy,Wheat,Coarse-grains,Gram and Pulses
Cotton and Jute crops
Tea and Coffee crops
Sugarcane,Groundnut,Rubber,Coconut,Tobacco,
Oilseeds,Vegetables,Spices,Fruits and Nuts,Agri-by products
Milk,Milk products,meat,eggs and other animal products

Manganese,Bauxite,Copper,Silver,Gold,limestone,
Mica,Diamond,Silica,China clay Asbestos,Gypsum,others
Production of Vacuum Pan Sugar
Production of indigenous open pan sugarcane,Palm sweeteners
Tea,Coffee processing,Vegetable Ghee,Edible oils,Beverages,
tobacco and other food products
Including Khadi,Hnadloom and Powerloom

Jute,Hemp and Mesta textiles,Carpet,Readymade garments,Cair
Products,Linoleum hats,Raincoats,Rubberised cloth
Including Furniture,construction materials
Pulp,Paper,Printing and Publishing,Newsprint
Including Footwear,apparel

Including Coke

Paints,Varnishes,Lacqures,Soaps,Cosmetics,Glycerine
Including Matches,Explosives,Drugs,Dyes and Glue

Glass Products,Earthern ware, Sanitary wares,Stone ware,Asbestos
Cement Products,Slate,Graphite,Optical Products

Air conditioners,boilers,Diesel Engines,Air-compressors,Ball and
Roller bearings,Washing Machines
Drills,Earth moving Cranes,Conveyors,Road Rollers,Construction
and Mining Machinery,Handtools,Containers,Polishing Utencils
Cutlery,Metal Furniture,Blades,Springs,Agri-Machinery,Industrial
Machinery,Machine Tools,Office Equipments
Generators,Transformers,Insulated cables,Batteries,Cells,Fans
Lamps,Tubes,Heaters,X-ray Eqpts.,Light Fittings,Household
appliances
Locomotives

37. Motor Vehicles

38. *Other Transport Equipments
39. Communication & Electronic Equipments

40. *Other Manufacturing

41. Rail Transport Service
42. Other Transport Service
43. Electricity
44. Construction

45. Communication
46. Other Services

* Sectors treated as Complementary for the purpose

Motor cars,Buses,Trucks,Jeeps,Motorcycles and Scooters

Bicycles,Ships,Boats,Bullock carts,Tongas,Carts,Rickshaws
Wireless communication,Radios,Teleprinters,Telephones,Telegraphs
Television,Computers,Control Equipments
Watches,Clocks,Medical Equipments,Weights and Measures,Sports,
goods,Pens,Advertising aids,Toys,Ivory,Wigs,Jewellery,Badges,
Aircrafts,Scientific Instruments,Meters,Photographic
instruments,Coins

Air,Motor,Water and Animal based transport services
Generation ,transmission and distribution of electricity
Including Rail Construction,Hydel reservoirs,Land improvements
in farms and in forests,forstation
Communication service only
Gas,Water Supply,Storage,Ware-housing,trade,Hotels
and Restaurents,Banking,Real Estate,Education,Reserach,Medical
Legal,Recreation,Relegious,Domestic,Laundry,Barber,Dying
Sanitary services,Public Administration,Defence,Police

of Imports

CHAPTER 4

INTER-SECTORAL LINKAGES OF EXTERNAL TRADE

4.1 Background

This chapter discusses the mathematical framework for estimating inter-sectoral linkages of foreign trade i.e. exports and imports to the domestic economy. The linkages can be estimated in three ways ,viz.

- (i) Direct Linkages ;
- (ii) Direct and indirect linkages ; and
- (iii) Direct,indirect and induced linkages.

Further the linkages are of two types i.e. backward and forward linkages. While the backward linkages are those which provide stimulus to domestic production through usage of domestically produced raw materials,primary products and the forward linkages provide basic intermediate inputs and semi-finished products to other sectors in the economy through the output of the concerned sector as use of outputs.These basically distinguish the upline and downline production, thereby increasing the inter-sectoral linkages in the economy.The level of inter-sectoral linkages increase in any economy with the level of development and it is termed as connectedness of the economy.

The next section of this chapter presents the background of inter-sectoral linkages in the form of brief introduction.The third part describes the direct and indirect linkages of exports and complementary imports on different domestic sectors in terms of production, income,employment and prices. Interalia it gives

the stimulus to complementary imports and exports due to the technology of production. The next section describes the direct, indirect and induced linkages together due to imports and exports for various entities as given earlier. It describes the method to distinguish the linkages due to complementary imports and competitive imports to domestic production so as to identify the individual sectors, which are crucial for imports and exports. The fifth and final section presents some concluding remarks on the study of inter-sectoral linkages.

4.2 Introduction

The concept of linkages was originated by Rasmussen (1956) and Hirschman (1958). They described that the industry has two types of linkages-backward and forward. The industry's backward linkages are determined by its purchases of raw materials and other inputs as intermediate inputs from the other industries and the forward linkages are determined by the sales of its products as intermediate inputs for other industries (sectors). The stimulating character of a linkage is understood by increase in output of an industry implying increased demand for the products of other sectors (termed as backward linkage) and by providing increased supply of products for use as intermediate inputs in other sectors (defined as forward linkage). To substantiate, we may cite example of increase in exports of sugar. The growth in export of sugar will have a backward linkage effect for growth in the sugarcane production and income to the farmers growing the extra amount of sugarcane. Similarly the growth in production of fertilisers or the tractors will provide boost to agricultural production (due to forward

linkages of fertiliser production and the production of agricultural implements). Which may provide further stimulus to industrial production through easy availability of raw materials as well as higher demand of industrial goods and other services by the farmers. Here we may distinguish between the direct, indirect and induced linkages with the help of an example. The growth of sugarcane production as result of growth in demand of sugar due to higher export of sugar is an example of the direct effect. The growth in requirement of other chemicals, bags, transport services ,labour, and marketting and other services etc. are the examples of the indirect linkages. The growth in demand in many other items due to the increased income of industrial workers, factory owners farmers,transporters,markettiers etc. is an example of induced effects. There may be positive and negative linkages e.g. growth in exports may induce increase in domestic prices, and growth in imports of a competitive good may reduce the demand and consecutive investment of substituting sector in the domestic economy.

As the linkage concept is based on the interdependence of industries (sectors), the most appropriate method to calculate sectoral linkages is by the use of Input-Output Tables. Such measurement has been made based on the technology coefficient matrix (A) or the inverse matrix often referred to as Leontief-Inverse as given by the following expression.

-1

(I - A) .

There are three approaches in this regard, viz.

- (i) Chenery-Watanbe (1958) approach ;
- (ii) Yotopoulos-Nugent (1973) approach ; and
- (iii) Rasmussen (1956) approach.

The Rasmussen's approach is the most widely used approach as it is found to be more effective than the other approaches on several counts. In case of forward linkages, however this approach is lately considered inappropriate. It is because of serious qualitative inconsistency in the evaluation of forward linkages by this approach. In view of this drawback of the Demand driven (Leontief) model, in case of forward linkages, recent methods suggest the use of Supply (Ghosh) model (as described in 2.2.5) or the Output approach in Input-Output Technique. This method for calculation of forward linkages is due to Augustinovics (1970), and is symmetrical to the traditional demand driven model or Input approach. The Supply driven I-O model has also been proposed for such evaluation by Jones (1976) and Bulmer Thomas (1982) to overcome the conceptual inconsistency of the Rasmussen approach of estimation of the forward linkages. The uses of this model in calculation of forward linkages and key sector analysis have been limited e.g. Augustinovics (1970), Beyers (1976) at the international level and in India Venkataramaiah et al (1984), Saxena & Rath (1991) and S.Dhawan (1993), which have used this Output approach for calculating the forward linkages. Here it may be appropriate to mention that although there have been some theoretical reservations against the Supply model e.g. Giarratani (1980) , Oosterhaven (1981), it can be argued that the Supply model can be safely used to indicate the comparative strength of

forward linkages of various sectors in the economy (Oosterhaven, 1988).

4.3 Direct & Indirect Linkages of Foreign Trade

The direct backward linkages have been measured using the simple column multiplier (of A matrix) and the direct forward linkages as the row multiplier (for overall forward linkages). Thus direct linkage of foreign trade can be estimated with the help of export coefficient vector as direct backward linkage due to the exports, while the row sum vector and column sum vectors of the Import-Coefficient matrix can be taken as the total direct forward and backward linkages of imports. Here it may be noted that the Demand driven (Leontief) model has been used for estimation of the backward linkages and the Supply driven (Ghosh) model has been applied for determining the forward linkages in this study. In the notations we can express these as below,

Let M be the Complementary Import-Coefficient matrix, then the direct import intensity (backward linkage to complementary imports) to the jth commodity sector can be expressed as below.

$$D_B_j = \sum_{i=1}^n M'_{ij} \quad \dots (4.1)$$

and the direct (export capability) forward linkage of the ith commodity sectors to the exports can be defined as follows.

$$D_F_i = \sum_{j=1}^n E_{ij} \quad \dots (4.2)$$

where M_{ij} is the supply of the i th commodity complementary import for production of the j th commodity in demand model.

while E_{ij} is the supply of the i th commodity for the production of j th export commodity in a supply driven framework.

It can be stated here that the backward direct linkages of imports will not be available to the domestic economy. Similarly the forward linkages of the exports would also not accrue to the concerned supplying economy.

Similarly for the Competitive imports, the direct linkages can be defined as below for the direct backward linkages due to competitive imports of i th good for production of the j th commodity in the demand driven model for the production of the j th commodity.

$$d_{bj} = \sum_{i=1}^n m_{ij} \quad \dots \quad (4.3)$$

For direct and indirect backward multipliers of various sectors and exports , the following equation can be used.

$$BOM_j = \sum_{i=1}^n R_{ij} \quad \dots \quad (4.4)$$

Here by BOM_j , we mean the Backward Output Multiplier for the j th sector. The direct and indirect backward output multipliers of the various sectors can be defined as the column totals of the Leontief inverse matrix. While for $i = 1, 2, \dots, 46$,

it will provide BOLs for the various production sectors, for $i=47$, it would provide the BOL due to exports. The value of BOM for any sectors and exports indicates the amount of output generated in the economy due to additional final demand of one unit in the concerned sector or one unit of exports provided by the economy respectively.

The above equation and the Rasmussen's index uses the elements of the Leontief inverse R or as given below

$$(I - A)^{-1} \quad ij$$

($I - A$) matrix. The backward output linkages of a sector j can be given by Y formulated by Rasmussen can be defined below.

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$$Y_j = \frac{\left(\sum_{i=1}^n R_{ij} \right) / n}{\left(\sum_{i=1}^n \sum_{j=1}^n R_{ij} \right) / n^2} \dots \dots \dots (4.5)$$

$$\forall j = 1, 2, 3, \dots, n$$

where R_{ij} is i th row and j th column element of inverse

ij

matrix R , n is the number of sectors.

The numerator of the above index (4.5) denotes the average stimulus provided to other sectors due to a unit worth of demand from sector j and the denominator denotes the average stimulus for the overall economy when all the final demands increase by one unit each.

If $\sum_j Y_j > 1$, it indicates that the sector j draws comparatively more from the rest of the sectors implying above average backward linkages and vice versa for $\sum_j Y_j < 1$.

This index is based on average and thus does not take into account the sector-wise dispersion effects. A sector may draw from one, few or many sectors. Therefore the above index has been supplemented with a measure of dispersion to reflect the pattern of variation of input pattern. The following measure of variation, corresponding to the index of backward linkages has been put forward by Rasmussen.

$$V_j = \frac{\sqrt{\frac{1}{(n-1)} \sum_{i=1}^n (R_{ij} - \frac{1}{n} \sum_{i=1}^n R_{ij})^2}}{\frac{1}{n} \sum_{i=1}^n R_{ij}}$$

$$, j = 1, 2, 3, \dots, n \dots (4.6)$$

a high value of V_j can be interpreted as showing that a particular sector j draws heavily on one or a few sectors and a low V_j means that the sector draws evenly from the other sectors.

Before defining the forward direct and indirect linkage indices, let us explain why the Demand driven (Leontief) model based forward linkage indices may not be appropriate. Let us assume a three sector economy for simplicity. The Leontief inverse matrix in this case will represent as follows.

$$R = \begin{bmatrix} d Y_1 & d Y_1 & d Y_1 \\ \overline{d F}_1 & \overline{d F}_2 & \overline{d F}_3 \\ d Y_2 & d Y_2 & d Y_2 \\ \overline{d F}_1 & \overline{d F}_2 & \overline{d F}_3 \\ d Y_3 & d Y_3 & d Y_3 \\ \overline{d F}_1 & \overline{d F}_2 & \overline{d F}_3 \end{bmatrix}$$

3 3 3

$$\text{Total } \sum_{i=1}^3 \frac{d Y_i}{\overline{d F}_i} \sum_{i=1}^3 \frac{d Y_i}{\overline{d F}_i} \sum_{i=1}^3 \frac{d Y_i}{\overline{d F}_i}$$

1 2 3

here $d Y_i$ = change in output in i th sector

and $\overline{d F}_i$ = change in final demand in i th sector.

i

the backward linkages in this case can be defined as below

$$Y = \sum_j \frac{d Y_i}{\overline{d F}_j}$$

But similar estimation of forward linkages can not be feasible due to increase in a particular type of final demand. So for the forward linkages the Supply model can be used by the Ghosh inverse as given below. In this case the change in output of various sectors can be meaningfully estimated due to the change in value added in a particular sector providing inputs to other sectors by the forward linkages based on Supply model. It

can be seen in the formulation clearly.

$$\begin{array}{c}
 \left[\begin{array}{ccc|c}
 d Y & d Y & d Y & \text{Total} \\
 1 & 2 & 3 & \sum_{j=1}^3 d Y_j \\
 \hline
 \overline{d V} & \overline{d V} & \overline{d V} & \overline{d V} \\
 1 & 1 & 1 & 1 \\
 \\
 \overset{*}{R} = \begin{array}{ccc|c}
 d Y & d Y & d Y & d Y_j \\
 1 & 2 & 3 & \sum_{j=1}^3 d Y_j \\
 \hline
 \overline{d V} & \overline{d V} & \overline{d V} & \overline{d V}_2 \\
 2 & 2 & 2 & 2 \\
 \\
 d Y & d Y & d Y & d Y_j \\
 1 & 2 & 3 & \sum_{j=1}^3 d Y_j \\
 \hline
 \overline{d V} & \overline{d V} & \overline{d V} & \overline{d V} \\
 3 & 3 & 3 & 3
 \end{array} \right]
 \end{array}$$

here $d V_i$ = change in value added in the i th sector.

Alternatively it can be verified as presented below. If the Leontief inverse is used for forward linkage then it could be defined as Rasmussen's index as follows.

$$F_i = \frac{\frac{1}{n} \sum_{j=1}^n R_{ij}}{\frac{1}{n} \sum_{i=1}^n \sum_{j=1}^n R_{ij}} \dots \quad (4.7)$$

, $i = 1, 2, 3$

The numerator of this index F refers to the i th row of the Leontief inverse, which measures the total impact of sector i , when final demand for all sectors increase by one unit. If this effect is large, it suggests that increased investment in sector i would induce output increases in all using sectors as users will avail advantage of the increased supply of inputs. The assumption that final demand for all sectors increases by a unit is misleading, since not all sectors are of equal importance in the structure of demand. With a large I-O table, a small sector (j) which relies heavily on sector i for inputs will lead to a biased index of forward linkage for sector i . Capacity expansion in sector i based on this 'high' forward linkage might, therefore, have a disappointing impact on the overall rate of growth of the economy, because of the small size of (using) sector j .

In view of this problem, it is better to approach the forward linkages from a different angle. Bulmer Thomas (1982) states that the main idea of forward linkage is to trace the output increases which occur or may occur in using industries when there is a change in the sector supplying inputs, just as the backward linkage provides the output increases which occur in supplying sectors when there is a change in the sector using their output as inputs. Therefore forward linkages should be based on the supply model which is discussed below.

The Supply model is expressed as

$$X' = V' * [I - A]^{-1} \dots \quad (4.8) \quad * -1 *$$

If the elements of the matrix $[I - A]$, R

are denoted by R_{ij} , then we can write as follows.

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$$X' = V' R^*$$

Now if we suppose that the value added in i th sector increases by one unit, it will induce forward linkages throughout the economy due to fixed output proportions. The total increase in output for the whole system is expressed by

$$FOM = \sum_{j=1}^n R^{*},$$

$$i \quad j=1 \quad ij$$

the row sum of the

matrix $(I - A)^{*}$. It can be considered as the forward output multiplier (FOM) of the i th sector. For $i = 47$ it will provide the estimate of the FOM of complementary imports. The value of FOM for any production sector or complementary imports indicates the amount of output generated in the economy due to additional value addition of one unit in the concerned sector or one unit of complementary imports procured by the economy respectively.

The modified Rasmussen's forward linkage can be defined as follows.

$$Z_i = \frac{\sum_{j=1}^n R^{*}}{\left(\sum_{i=1}^n \sum_{j=1}^n R^{*} \right) / n^2} \quad \forall i = 1, 2, 3, \dots, n \dots \quad (4.9)$$

and the measure of variation corresponding to the forward linkage V as follows.

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$$V_i = \frac{\sqrt{1 + \sum_{j=1}^n R_{ij} - \frac{1}{n} \sum_{j=1}^n R_{ij}}^2}{\frac{1}{n} \sum_{j=1}^n R_{ij}}, \quad i = 1, 2, 3, \dots, n$$

..... (4.10)

This new measure of forward linkages Z is quite different from previous, F_i .

It is because it measures the forward linkage as the increase in the output of all using sectors rather than as the increase in the output of one supplying sector, which is actually the essence of the forward linkages (Bulmer Thomas, 1982).

Thus $Z_i > 1$ implies a sector with high (above average) forward linkages and vice versa if $Z_i < 1$.

V_i shows the extent to which all using industries draw evenly on industry i or otherwise i.e. a high V_i means that one or a few sectors use the output of sector i , while a low V_i shows that sector i supplies evenly to the other sectors.

The total linkages of various sectors with imports included in the technology matrix will thus include the linkages due to imports as well as exports, so it is not fair to term such linkages as linkages available to the domestic economy. Therefore it is necessary to segregate the linkages due to competitive and complementary imports and exports and other domestic sectors in a

semi-closed model as described in the following section.

4.4 Direct, Indirect and Induced Linkages of Foreign Trade

For calculating the direct, indirect and induced linkages together, the semi-closed Input-Output model endogenising the exports and complementary imports has been developed. While doing this the complementary imports have been subtracted from the technology -coefficient matrix and the column sums of complementary imports has been included as a row vector of complementary imports (47th row in this study in addition to 46 domestic production sectors), while export-coefficients have been included as 47th column as a using sector. The linkages can be similarly estimated for all the sectors as described in (4.3) above.

Y_j for $j = 47$ will provide backward linkage due to export.

j

while for other sectors it will provide net backward linkages (net of complementary imports). It will be estimated by using $n = 46$ in numerator and $n = 47$ in the denominator in the equations (4.5) and (4.6).

Further after subtracting the competitive imports also from the technology matrix, the net backward linkages can be obtained for complementary imports and other sectors net of all imports in a similar way to estimate the impact of competitive imports.

On the same pattern from the Supply model, the direct, indirect and induced forward linkages can be calculated with the help of semi-closed output-inverse with endogenised foreign trade. Then correspondingly Z^i for $i = 47$ will give the

forward linkages due to complementary imports. The net change in the forward linkages of the other sectors due to separation of complementary imports can be estimated by comparing the total forward linkages with the forward linkages net of complementary imports. It can be done by taking $n = 46$ in the numerator and $n = 47$ in the denominator in equations (4.9) and (4.10). It is done to segregate the linkages to domestic sectors out of the total linkages in the economy including that of the foreign trade. On the similar pattern , the net linkages (net of all imports) can be calculated with the help of matrix using semi-closed I-O model less competitive imports. In this way the net change in the linkages of various sectors after segregating the complementary and competitive imports can be estimated. This procedure helps us to identify the sectors which are affected in a significant way in terms of linkages due to the two types of imports and/or exports.

The employment, income and capital linkages can also be calculated on the same pattern as below.

The Labour-Output Coefficient can be defined as-

$$L_i = \frac{Q_i}{X_i} \dots \dots \dots \quad (4.11)$$

where Q_i is the number of persons employed in sector i , L_i is the labour-output coefficient for the sector, i , X_i being the gross output for the i th sector.

The backward Labour Linkages (BLLs) can be estimated as below with the help of the following equation.

$$\text{Thus } E = \langle L \rangle^{-1} * (I - A)^{-1} * F = K^{-1} * F \dots (4.12)$$

E = $n \times n$ matrix of direct and indirect labour requirement of the final demand vector.

The elements of $\langle L \rangle^{-1} * (I - A)^{-1}$, K^{-1} give the estimates of direct and indirect employment generation with the unitary increase in the final demand for each of the sectors. Here $\langle L \rangle$ is the diagonal matrix of the labour output coefficients. The Backward Labour Multiplier (BLM) can be defined as the column total of the concerned sectors of the K matrix. The BLM for $j = 47$ would provide the BLM due to the exports.. The BLM can be defined as below.

$$\text{BLM} = \sum_{j=1}^n K_{ij}$$

The backward linkages of employment can be defined as below.

$$Y_j = \frac{\sum_{i=1}^n k_{ij}}{\left(\sum_{i=1}^n \sum_{j=1}^n k_{ij} \right)^2}, \quad j = 1, 2, 3, \dots, n \dots (4.13)$$

Similarly for the forward linkages, we use the supply model or the output-inverse matrix as below.

* -1 *

$$E' = V * (I - A) * \langle L \rangle = V * K \dots (4.14)$$

Similar to the BLMs, the FLMs, the forward labour

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multipliers can be defined as the row sum of the K matrix as below.

$$\text{FLM} = \sum_{i=1}^n K_{ij}$$

FLM for $i=47$ would provide FLM due to the complementary imports. While for $i=1, 2, \dots, 46$ the same will be for the various production sectors. The forward employment linkages can be defined as given below.

$$Z_i = \frac{\sum_{j=1}^n k_{ij} / n}{(\sum_{i=1}^n \sum_{j=1}^n k_{ij} / n)^2}, i = 1, 2, 3, \dots, n \dots (4.15)$$

On the pattern of modified Rasmussen's linkage indices for measurement of variation, the corresponding formulae for coefficient of dispersion for employment linkages can be defined as follows.

$$V_j^E = \sqrt{\frac{\frac{1}{(n-1)} \sum_{i=1}^n (k_{ij} - \frac{1}{n} \sum_{i=1}^n k_{ij})^2}{\frac{1}{n} \sum_{i=1}^n k_{ij}}}, j = 1, 2, 3, \dots, n \dots (4.16)$$

and

$$V_i^E = \frac{\sqrt{\sqrt{\left(\frac{1}{n-1} + \sum_{j=1}^n \left(\frac{k^*}{ij} - \frac{1}{n} \right) \sum_{j=1}^n \frac{k^*}{ij} \right)^2}}}{\frac{1}{n} \sum_{j=1}^n \frac{k^*}{ij}}$$

, $i = 1, 2, 3, \dots, n$
..... (4.17)

The above linkages Y_j^E and V_i^E respectively

$$E_j \quad j$$

signify that if Y_j^E is high then the sector j provides large backward employment linkages to the sectors which provide inputs to the sector j , thus helping to identify the sectors, which may help generate more employment in the supplying sectors.

$$E_j$$

While V_i^E tells that the variation in employment

$$j$$

generation in the supplying sectors, whether the stimulus to employment occurs in a few sectors or more sectors with even growth over the supplying sectors.

$$E_j \quad E_j$$

Thus the sectors with high Y_j^E , low V_i^E should be

$$j \quad j$$

be given priority.

$$E_i \quad E_i$$

Similarly Z_i^E and V_i^E signify the forward

employment linkages of the other sectors due to unit change in the i th sector.

sector as more employment intensive in the down-stream production e.g. the fertiliser sector in case of forward linkages and agro-based industry like sugar and khandsari in case of backward employment linkages.

On the same pattern the income multipliers and linkages can be defined as below with the help of income-output coefficient vector.

$$\text{and } I = G' * (I - A)^{-1} * F = T * F \dots \dots (4.19)$$

here $I = n \times n$ diagonal matrix of direct and indirect income generation due to the unit growth in final demand vector F .

On the same pattern as in case of employment linkages, direct and indirect income linkages of forward and backward type can be defined.

Similarly capital-use linkages can be defined for the economy. In fact it can be applied for energy intensity estimation with the help of energy linkages as well.

If the capital consumption in the i th sector is denoted by C_i , then the capital consumption-output coefficient or the Capital-Input Coefficient can be defined as below.

$$c = c / x \dots \dots \dots \quad (4.20)$$

i i i
here c being the capital-input coefficient.

i

and with the help of capital-input coefficients ,the direct and indierct capital requirement vector for unit increase in the final demand can be estimated as below.

$$\hat{C}^{-1} = C' * (I - A)^{-1} * F = K * F \dots \dots \dots \quad (4.21)$$

On the same pattern, the backward and forward capital linkages of the sector j can be defined by corresponding formulae

C

with the help of the matrix, K . This can help in estimating the capital intensity of various sectors through backward and forward linkages.

Since there is no foreign trade sector in the real economy as producing sector for the purpose of employment, so to segregate the effect of foreign trade on the front of employment, income and capital intensity, the above forward and backward linkages are to be estimated three times for the whole technology matrix including all imports giving linkages of various sectors .The second type of linkages can be estimated for thefor the semi-closed model excluding complementary imports only, which will provide the linkages for employment, income and capital intensity in the absence of the complementary imports, thereby by comparing these linkages with overall linkages, the sectors can be identified which are significantly affected in terms of employment, income and capital intensity in the absence

of complementary imports. This will be helpful to identify the both types of sectors, which are positively and negatively affected in anyone way or more due to the complementary imports.

Further to evaluate the effects of competitive imports, these linkages can be estimated for the matrix which excludes all the imports. It will provide the linkages in absence of all imports, thereby excluding the effect of total imports on the linkages in terms of employment, income and capital consumption. Although exports or complementary imports do not directly provide for any employment in the economy as activities themselves. But the employment is generated indirectly through them in many other sectors e.g. transportation, consultancy, research, training etc. Further as the exports provide additional demand in the economy for various products directly, they affect the capacity utilisation positively as well as provide for economies of scale in case of some sectors. Similarly the imports, particularly which are of essential nature and not substitutable in short period also provide for additional activities and production channels in many sectors, thereby helping in creating some indirect employment in other sectors. Further, as a result of additional income generated through exports and by way of additional production activity in the economy as a whole due to availability of essential imports, the scope for additional employment as well as income generation and capital formation is created in many sectors through induced effects. Through the backward and forward employment, income and capital linkages in the semi-closed Input-Output frame-work, the effects of exports and complementary imports can also be estimated. Even negative effets due to the imports can be estimated through semi-closed I-O frame-work in

terms of income, employment and capital-intensity of imports. It can be done by using the employment-matrix of the order $n \times n$ and 0's in $(n+1)$ th row and column (for direct employment intensity for exports/imports) for pre/post multiplication with the Leontief/Ghosh inverse with endogenised foreign trade, i.e. $(n+1) \times (n+1)$ order matrix. Similarly the income and capital linkages can be estimated in semi-closed I-O frame-work.

This exercise may help to identify the types of imports which may positively or negatively affect the labour employment ,income generation and capital requirement in the economy. It could help to answer the question whether globalisation is likely to lead us to more capital intensive economy or more labour intensive economy and whether overall the economy will be able to provide employment and income to larger number of persons in future or not in spite of change in labour/capital intensity.

4.4.1 Potential Loss of Output

The linkage analysis is affected uniformly by the change in any particular final demand by one unit. So to overcome this shortcoming, the changes in the import-intensity of particular type of imports of a category of final demand will be estimated with the help of the estimates of loss of possible production due to imports in different categories. This will be estimated by the model as below.

$$X = (I - A)^* F^{-1} \quad \dots \dots \dots \quad (4.22)$$

Here A^* is the semi-closed I - O table, F is a vector of

imports of a type for a category of final demand. it can also provide the saving in this process of the necessary imports, thereby estimating the net gain or loss in terms of foreign exchange. Similarly the potential loss of output and saving of essential imports due to intermediate imports can also be estimated by replacing vector F by the vector of intermediate imports of either type for the concerned category of imports.

4.5 Concluding Remarks

The above analysis of the Indian economy with the help of backward and forward linkages will provide the structural change over the years with respect to import intensity of various sectors as well as stimulus to export likely from various sectors. Since the method adopted will segregate the linkages due to two types of imports and due to the exports, the study will be in a position to provide answers to the complex questions as follows.

(a) whether exports expansion in different categories of items will really enable the Indian economy to grow faster ? and which sectors are likely to benefit in terms of output, employment, income etc ? and which sectors are likely to lose in one or more ways ? ;

(b) it will also be able to reply to the difficult question as to whether liberalising different types of imports will help boost production, employment and income in the economy as a whole ? or which sectors will be promoted in terms of output, income generation and employment at the cost of which sectors ?



direct, indirect and induced linkages taken together for various sectors and exports. First we will discuss the direct import linkages of various sectors over the years. As the export activity does not directly produce any output, there are no direct import linkages of exports as it is included as a production sector in other service sector(Trade is included in the other service sector in this study as explained in chapter3 and given in annexure-3.1).

5.2.1.1 Import Intensity of Intermediate Use

Table 5.1 presents the proportion of intermediate imports out of total intermediate input for various sectors during the years 1979-80, 1984-85, 1989-90, 1991-92 and as expected during 1996-97. These proportions provide information about the import dependence of various sectors for intermediate consumption over the years. From this table we observe that the overall proportion of imports out of total intermediate input marginally decreased from 1979-80 to 1984-85 (i.e. , the pre-import-liberalisation phase). However it increased rapidly after mild liberalisation during 1984-85. But since 1991-92 , i.e. after major liberalisation of foreign trade, it has decreased comparatively, although it still remained significantly more than the same during 1979-80.

When we look at the direct import intensity of various sectors over the years, we find that during the pre-liberalisation phase the proportion of imports out of the total intermediate input increased for 21 sectors, decreased for 19 sectors and remained almost unchanged for 6 sectors. During this period it

**Table 5.1 : Proportion of Intermediate Imports Out of
Total Intermediate Input (in percentages)**

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	0.8373	1.9386	0.4790	1.7078	1.6121
2	0.4063	1.8237	1.2621	3.3621	3.1044
3	3.5443	0.0000	0.2150	1.5368	1.2991
4	0.3309	1.2417	0.4558	2.0620	3.0071
5	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0230	0.0757	0.0899	0.2292	0.2151
9 *	0.1380	0.0020	0.0082	0.0613	0.0475
10	0.0000	0.0000	0.0000	0.0000	0.0000
11 *	0.0690	0.0209	0.0918	0.6854	0.5174
12	0.1485	0.2565	0.0000	0.0000	0.9500
13	0.0000	0.0000	0.0000	0.0000	1.8659
14	0.9569	1.6119	0.5493	0.9594	0.9395
15	0.1900	0.5593	0.6744	1.1318	1.1513
16	8.7178	4.6947	4.5827	21.0976	7.4684
17	4.6012	0.3503	1.2791	6.7472	7.7304
18	0.3301	0.3214	0.2867	1.7339	1.7834
19	0.3701	0.6020	9.6631	21.9396	21.4614
20 *	2.6323	2.5637	0.8951	1.8761	3.4616
21	1.0726	1.0162	1.5680	3.2941	2.8638
22	3.6970	1.2569	3.5723	4.2372	6.5584
23	8.7898	5.5211	8.7942	47.8148	45.0756
24 *	84.9853	43.8885	42.5612	29.1574	14.8988
25	6.2533	2.9869	0.0776	0.1073	0.1040
26 *	3.3051	4.4779	7.0112	12.7138	10.8304
27 *	4.3975	0.9622	2.2274	4.0397	5.8916
28	3.9164	1.1377	0.1730	0.2893	1.7273
29 *	5.9864	4.0671	5.7031	10.3648	10.2166
30	3.3168	8.3490	0.3552	0.6666	18.8181
31 *	4.6157	8.8377	9.0445	20.5672	16.9112
32 *	7.5133	4.8527	9.6718	5.4388	5.3140
33 *	9.3331	5.4660	9.9705	9.5044	8.0791
34 *	6.6401	8.0507	11.3740	11.3012	4.6939
35 *	4.7359	5.2763	9.2290	10.8537	9.1967
36	0.6189	6.0348	4.0569	4.8180	5.3965
37	3.0986	3.7071	8.7867	7.1095	6.4581
38 *	4.1322	5.2370	8.9768	23.9009	19.1782
39	5.6479	4.2703	3.6218	8.1497	9.2666
40 *	1.4296	3.9509	8.3339	11.3757	43.6945
41	1.9450	1.8787	1.0912	2.4892	2.9692
42	5.3802	7.2263	3.8366	13.8341	10.4072
43	0.1383	0.2620	0.6459	1.5823	1.8186
44	1.4185	1.8539	4.8959	11.4864	10.0882
45	0.0000	0.0000	0.0000	0.0000	0.0000
46	0.3343	0.6142	0.7672	5.1242	4.4343
Total	5.8844	5.5106	7.8859	7.5450	6.8850

* denotes sectors treated as Complementary for Imports

increased mostly in agricultural sectors, machinery/transport manufacturing and service sectors. After the mild liberalisation during 1984-85, it increased for 31 sectors, decreased for 9 sectors and remained unchanged in the other 6 sectors. But after the major liberalisation during 1991-92, we observe that for 16 sectors only the proportion of imports out of total intermediate input is likely to increase, while it may decrease for 25 sectors and may remain at the same level for 5 sectors. Thus we find that after major liberalisation of foreign trade the direct import intensity is likely to come down gradually.

When we analyse the import intensity of sectors treated competitive and complementary (as defined in section 2.5) for the purpose of imports separately, we observe that in case of the sectors providing substitutes (replacements) for complementary imports, the import intensity increased for 6 sectors in pre-liberalisation phase, while it increased for 12 sectors after the mild liberalisation of trade. But after major liberalisation, we find that the same may increase in case of 3 sectors only and may decrease for 11 sectors.

Similarly in case of the sectors providing the substitutes for the competitive imports also, we observe that the import intensity of domestic production in such sectors increased for 15 sectors during pre-liberalisation phase, for 19 sectors after mild liberalisation and is likely to increase for only 13 sectors after the major liberalisation of trade during 1991-92.

While before 1984-85, the increase in import intensity took place in agriculture, machinery & transport equipment manufacturing sectors and services except communication. After

1984-85 till 1991-92, the import intensity increased more in agro-based industries, chemicals in addition to the above. But after 1991-92 ,the increase is likely to be very significant in agro-based industries rather than in the agricultural sectors, chemical products, railway transport equipments, textiles, electronic and telecommunication equipments, electricity and other manufacturing sectors. The decline in import intensity is likely in mining, machinery, other transport sector, services, and other services sectors.

During the whole period in the eighties and early ninties the import intensity has increased in other manufacturing,other transport (except during the period after 1991-92), electricity and construction sectors. However in petroleum products, coal tar products sectors, the import intensity has gone down in the whole period.

Thus we observe that the import intensity of domestic production increased in more sectors after mild level of trade liberalisation in general and in case of the sectors providing substitutes of complementary imports in particular.But after the major dose of trade liberalisation in India the import intensity is likely to come down in more sectors and at overall level than that during the earlier period.It may be due to reduction in bottlenecks of production process and curtailment in the period of work-stoppages due to lack of imported raw materials/ capital goods. This reason seems to apply much more in case of the substitutes of complementary imports.

5.2.1.2 Import Intensity of Total Domestic Demand

Another aspect of import intensity is the overall domestic demand of imports i.e.including that of final demand. It is because, the liberalisation of foreign trade might induce more imports as a result of easy availability of imports for meeting the consumption or investment demand rather than the intermediate demand. We present the comparative estimates of proportion of imports out of total supply by category of imports over the years in Table 5.2 . A picture of overall temporal variation can be had from Fig. 5.1.

From the Table 5.2 we observe that the share of intermediate consumption has been going down out of the total imports over the years even from the pre-liberalisation period and it is again likely to decrease further after 1991-92. While the share of private consumption in the imports has been increasing particularly after 1984-85. Here it may be seen that the share of public consumption in imports has not increased much, but its progress needs to be monitored in the future. The share of investment in imports has increased before the liberalisation phase started during 1984-85, however since 1984-85, the share of investment has almost remained at the same level and it is likely to be almost stagnant in furure also. When we compare the shares of the competitive and complementary imports used for various purposes over the years, we find that use of competitive imports for private consumption is likely to go up very significantly in future, while its use for intermediate

Table 5.2 : Distribution of Imports by Category of Use for Competitive and Complementary Imports over the Years in Percentages

Category of	During 1979-80		During 1984-85		During 1989-90	
Use of Imports	Comp.	Compl.	Comp.	Compl.	Comp.	Compl.
1. Intermediate Consumption	45.82 (72.56)	77.73	56.52 (49.75)	47.22	17.43 (49.80)	64.99
2. Private Consumption	49.60 (15.05)	08.34	37.22 (17.16)	09.66	57.32 (23.42)	07.52
3. Public Consumption	00.56 (02.34)	02.78	01.56 (19.87)	25.34	03.15 (02.73)	02.53
4. Fixed capital Investment	04.02 (10.05)	11.15	04.70 (14.22)	17.78	22.10 (24.05)	24.96
	(100.00)		(100.00)		(100.00)	

Table 5.2 (Continued)

Category of	During 1991-92		During 1996-97	
Use of Imports	Comp.	Compl.	Comp.	Compl.
1. Intermediate Consumption	33.38 (48.86)	55.82	24.88 (42.24)	50.79
2. Private Consumption	56.57 (24.94)	10.72	67.30 (30.88)	12.95
3. Public Consumption	01.95 (03.85)	04.71	01.69 (02.82)	03.37
4. Fixed capital Investment	08.10 (22.35)	28.73	06.13 (24.06)	32.89
	(100.00)		(100.00)	

Figures in brackets give distribution out of total imports for the concerned Year

Fig 5.1 Distribution of Imports

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by category over the Years

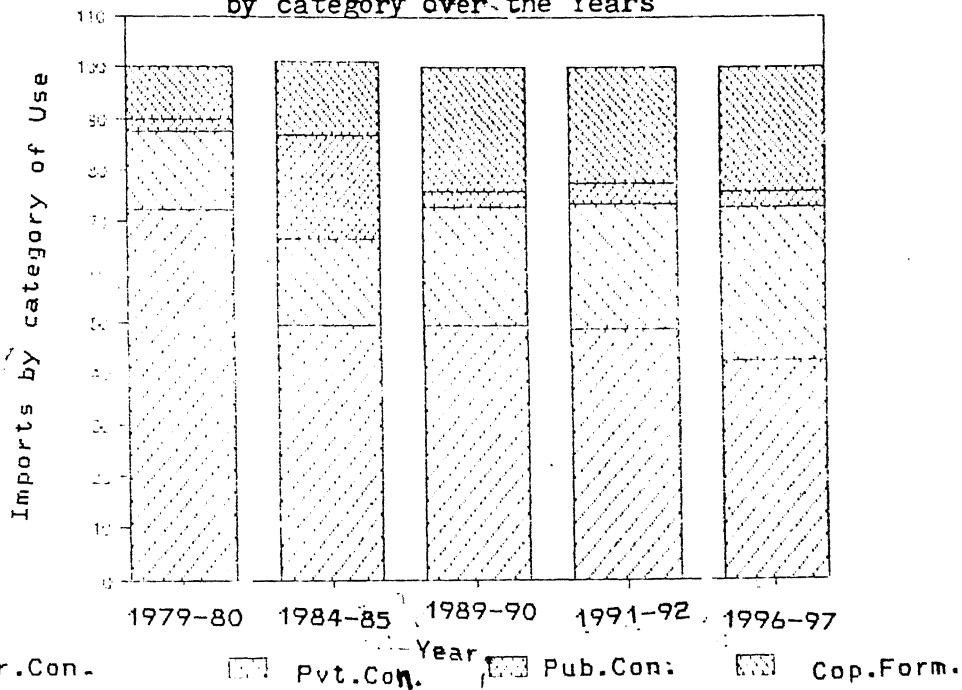
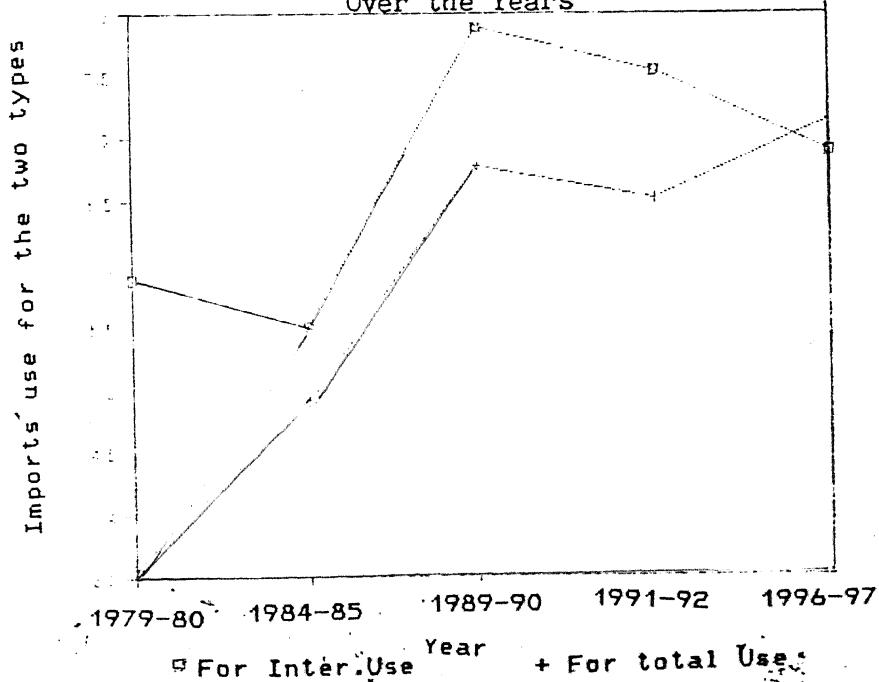


Fig 5.1 (a) Use of Imports

Over the Years



consumption is likely to decrease markedly in future. The use of competitive imports for investment purposes is also likely to come down comparatively. In case of complementary imports also although the trend is likely to be similar, but the extent of decline in use for intermediate consumption and growth in share of use for private consumption purpose is likely to be much less in case of complementary imports. It shows that more care is required particularly in case of competitive imports used for private consumption to reduce the trade-balance. These imports can also be substituted in the short-run without much difficulty.

For viewing the sector-wise position of import-intensity of total use let us study the Table 5.3. We observe from this table that the proportion of imports out of total supply for the overall economy as such increased continuously from 1979-80 to 1989-90, decreased marginally during 1991-92 (it might have been due to severe cuts imposed on imports owing to foreign exchange crisis) but it is again likely to increase after major liberalisation policy of 1991. Thus we find that the import intensity of final demand has increased unabated since 1979-80 whether we consider it as the impact of liberalisation of trade or not.

When we compare the import intensity of total demand for various sectors over the years, we observe that before 1984-85 (i.e. pre-liberalisation phase), the import intensity increased for 21 sectors, came down for 16 sectors and remained same in other 9 sectors. After mild level of liberalisation of trade during 1984-85, till 1991-92, the imports as a proportion of total supply -by sector increased for 36 sectors, decreased in

**Table 5.3 :Proportion of Imports Out of Total Supply
Over the Years (in percentages)**

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	0.0000	0.0000	0.0045	0.2465	0.2575
2	0.0000	0.6299	1.1352	1.3933	1.5288
3	0.8743	0.0000	0.0000	0.0000	0.0000
4	0.3834	0.4174	0.1599	0.4300	0.4123
5	0.0376	0.2832	0.1348	1.0446	1.2517
6	0.3196	0.4326	3.3184	6.3026	9.6177
7	0.0987	0.2866	0.0044	0.0818	0.1206
8	3.0028	1.9043	6.8496	5.9539	2.2085
9 *	89.4209	36.8760	70.4367	37.7069	21.6177
10	0.0830	0.0000	0.0000	0.0000	0.0000
11 *	52.0779	31.8497	65.1693	69.8103	80.6868
12	0.0000	0.0000	0.0350	0.1374	0.5061
13	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.2256	0.8774	0.0679	1.4986	2.3533
15	0.0000	0.0069	0.0265	0.2067	0.2357
16	0.7530	0.0627	0.2510	1.9205	1.9384
17	0.0937	0.1650	0.6598	4.8310	5.0488
18	0.0315	0.1267	0.0242	1.4762	1.5593
19	0.0511	0.1450	0.8859	1.1499	1.1979
20 *	5.4384	4.1872	2.5637	7.2283	8.3705
21	0.0097	0.0440	0.7685	1.1356	0.8272
22	0.1698	0.5868	0.3127	1.2297	1.1965
23	10.2583	0.0000	1.1674	3.6444	2.2083
24 *	11.0957	10.2464	5.1137	17.5749	25.9780
25	0.2323	0.0000	3.6803	5.6579	7.1770
26 *	8.4002	18.0377	5.8178	7.1390	7.8859
27 *	2.8250	3.1537	3.3669	4.2155	4.6387
28	4.4623	9.0660	20.6403	57.4243	25.7156
29 *	12.9677	5.3408	7.1552	11.0461	9.8910
30	9.7126	3.1448	0.0583	0.0953	0.7900
31 *	0.4142	1.0286	0.9582	3.2264	2.1386
32 *	12.4263	7.8872	18.6932	4.8242	4.6969
33 *	7.4113	10.3938	43.2186	19.2908	18.0913
34 *	1.9059	3.3546	4.9815	36.2817	37.7074
35 *	0.5024	1.4182	2.3285	10.4324	12.0503
36	0.1708	1.2208	0.4302	2.3223	2.7685
37	0.3055	0.2616	0.5690	5.8662	4.1155
38 *	4.5225	4.4604	5.6625	33.7683	30.3317
39	5.7897	1.6478	1.8803	32.3022	27.2370
40 *	1.7461	3.5757	2.4883	16.2200	8.8401
41	0.0000	0.0000	0.0000	0.0000	0.0000
42	0.0000	0.0000	1.3396	11.9064	14.3017
43	0.0000	0.0000	0.0000	0.0000	0.1220
44	0.0000	0.0000	0.0000	0.0000	0.0000
45	0.0000	0.0000	0.0000	3.6739	4.7932
46	0.0000	0.0000	0.1505	1.5347	2.0530
Total	3.5627	4.9118	6.7667	6.5126	7.1410

* denotes sectors treated as Complementary for Imports

only 4, remained at same level in the other 6 sectors. Thus we observe that after limited liberalisation, the import intensity of total use increased very significantly in large numer of sectors as well as for the overall economy. After major liberalisation during 1991-92, the position is however ,likely to change as follows. The import intensity of total use is likely to increase in 26 sectors, decrease in 15 and may remain at same level in remaining 5 sectors. It indicates that the import intensity of total domestic use is likely to increase in more sectors, but comparative to the earlier phase of liberalisation, such sectors of increasing import intensity may be less and those of decreasing import intensity may be more.

The comparative analysis of import intensity of total domestic use for competitive and complementary imports separately is provided as follows. While in case of competitive imports, we observe that the number of sectors for which the import intensity of total domestic use has increased or is likely to increase during the above three periods viz. before 1984-85, after 1984-85 till 1991-92 and after 1991-92 are 14, 24 and 19 respectively. On the other hand the sectors for which there is decreasing trend in import intensity of total use are 9, 2 and 8 respectively. The corresponding sectors for increasing trend in import intensity of total use for complementary imports during the respective periods are 7,12 and 7 in that order , while those for which there is decreasing trend in import intensity of total use over the same periods happen to be 7,2 and 7 respectively. Therefore we find that in case of competitive imports, the import intensity of total domestic use has increased in more sectors after mild level of liberalisation of trade and it has been moderated after the

major liberalisation of trade. But in case of complementary imports, although the import intensity of total domestic use has gone up after the mild level of liberalisation of trade, the same however followed similar trend as in pre-liberalisation phase. Thus we observe that the import intensity of total use has been moderated after the major liberalisation of trade particularly in case of essential imports.

Further we observe from the Table 5.3 that while in the pre-liberalisation period, i.e. before 1984-85 agricultural, agro-based industrial sectors showed growth in import intensity of total use the mining, chemical products and cement sectors have shown decline in it. After 1984-85 but before 1991-92, i.e., after mild level of liberalisation, agricultural, mining, agro-based industries, machinery & transport and services sectors showed significant increase in import intensity of total use. In fact except fishing, coal mining, fertilisers and iron & steel, all sectors showed spurt in import intensity of total use. After 1991-92, however, agricultural, agro-based industries, fertilisers, chemicals, non-electrical machinery are likely to show increase in it and in case of other transport, electricity, communication and other services sectors, the growth is likely to be very significant during this period of major liberalisation.

From the above analysis of direct import intensity of intermediate use and total domestic use we find that the import requirement of intermediate use, which is meant for production purposes is likely to go down, the same for the final uses however has been increasing at fast pace after liberalisation of foreign trade. It is not an encouraging sign for an economy which

is facing negative trade-balance regularly. The imports of particularly those goods which are used to meet private consumption and government consumption demand should not be encouraged, although the imports needed for production purposes may be allowed. Here it may be noted that any competitive imports can be substituted with some extra efforts in the short-run and all the imports affect the domestic production adversely by way of direct as well as indirect and induced linkages. Therefore it is important to decide the policies very prudently in case of foreign trade so as to minimise the trade-balance and to maximise the domestic production in short as well as in the long run.

These results are however on the basis of the direct import-linkages only, which do not take into account the indirect and the induced linkages of the foreign trade in the domestic economy. The compound effect of the direct, indirect and induced linkages will be discussed in this chapter latter in the semi-closed Input-Output model frame-work .

5.2.2 Export Capability

As it is important to reduce the overall import-intensity of domestic economy for self-sufficiency as well as for growth of production and to improve the trade-balance , it is also of significant importance to increase the export-capability of the domestic economy. It means the capability of various sectors of the economy to provide production for exports. As, certain type of goods are essential to be imported due to the current technology, economy of production and the domestic

resource-base, it is must to provide necessary value of exports to meet the requirement of foreign exchange. It is essential to balance the trade, keep the domestic currency comparatively at favourable international exchange rate as well as for increasing the share in the world trade. In this section we will discuss this aspect in detail for the Indian economy as a whole and for the various individual sectors.

5.2.2.1 Exports as Proportion of Total Output

The proportion of exports out of total domestic output of the economy as a whole and for various sectors is presented in Table 5.4. This table presents the proportion of exports out of the total domestic output for various sectors for the years 1979-80, 1984-85, 1989-90, 1991-92 and projected proportions for the year 1996-97. From this table we observe that the export capability increased during the period 1979-80 to 1984-85, i.e. the pre-liberalisation phase in 18 sectors and came down in 25 sectors, remaining at same level in the other 3 sectors. However after mild level of liberalisation during 1984-85, the same increased in 31 sectors and came down in 12 sectors only. It happened between 1984-85 and 1991-92. After the major liberalisation i.e. after 1991-92 the export capability is likely to increase in 24 sectors and to decrease in the 18 sectors. So we find that the export capability is likely to go up in more sectors after liberalisation of foreign trade. Thus we observe that after the mild level of liberalisation of trade, the export potential of more sectors increased compared to the earlier period. However after the major liberalisation in 1991-92, the export potential

Table 5.4: Proportion of Exports out of the Total Output over the Years

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	0.011129	0.013544	0.006135	0.006560	0.008823
2	0.032932	0.020169	0.009710	0.121179	0.117313
3	0.003796	0.000000	0.126446	0.266880	0.126719
4	0.022799	0.025593	0.026586	0.044371	0.063326
5	0.003715	0.002647	0.002545	0.004010	0.003992
6	0.059002	0.111910	0	0	0
7	0.004071	0.043211	0.164504	0.247891	0.260750
8	0.007975	0.001122	0.001381	0.003215	0.002598
9	0	0.642586	0	0	0
10	0.665112	0.468216	0.611858	0.571329	0.632924
11	0.124643	0.092484	0.136186	0.191125	0.254174
12	0.031104	0.015118	0.004304	0.003145	0.004862
13	0.000346	-2.7E-20	0	0	0
14	0.130051	0.118406	0.041925	0.036162	0.036299
15	0.047401	0.045353	0.044543	0.079204	0.108191
16	0.068513	0.014644	0.017680	0.045488	0.048412
17	0.043374	0.047980	0.009474	0.018325	0.019917
18	0.269188	0.079765	0.340362	0.380527	0.532141
19	0.010312	0.011034	0.003465	0.004919	0.004063
20	0.008869	0.006292	0.002485	0.002748	0.002469
21	0.339240	0.330860	0.449341	0.572693	0.437501
22	0.019313	0.022256	0.104492	0.141585	0.116994
23	0.041611	0.028039	0.070511	0.083710	0.062933
24	0	0.036450	0.020870	0.048024	0.038759
25	0.019722	-0.000000	0.000250	0.000856	0.001458
26	0	0.000012	0.000120	0.000119	0.000147
27	0.003226	0.015566	0.038789	0.037570	0.062742
28	0.022085	0.001289	0.014441	0.034557	0.025655
29	0.025644	0.090347	0.054276	0.104951	0.161626
30	0.003124	-0.000000	0	0	0.008666
31	0.016018	0.017453	0.518095	0.052811	0.033599
32	0.030171	0.009369	0.011710	0.006930	0.005892
33	0.050638	0.003882	0.033877	0.026682	0.028227
34	0.037842	0.061184	0.078473	0.075946	0.085520
35	0.046284	0.036210	0.031930	0.039841	0.038415
36	0.039260	0.015102	0.004245	0.003498	0.003941
37	0.042708	0.066996	0.040096	0.052643	0.042117
38	0.045625	0.008548	0.062520	0.080360	0.087027
39	0.039903	0.012799	0.072425	0.073858	0.182884
40	0.263677	0.499685	0.032046	0.302996	0.449872
41	0.036862	0.055422	0.072908	0.055253	0.135590
42	0.016858	0.018391	0.067926	0.067970	0.053176
43	0	0	0.000284	0.000324	0.000217
44	0	0	0	0	0
45	0	0	0.024623	0.017061	0.012100
46	0.021270	0.024761	0.047857	0.058249	0.073424
Total	0.034580	0.042383	0.047620	0.058298	0.078429

of some of these sectors is likely to suffer comparatively, may be because of withdrawal of export subsidies since 1991. However overall for the economy as a whole we find that the export capability is increasing regularly during the whole period of the eighties and it is likely to increase at faster pace in the early nineties as well.

The main sectors which showed growth in export potential during the pre-liberalisation phase were foodgrains ,other crops, forestry, fishing, agro-based industries (other than textiles), chemicals, other manufacturing, transport services and other services sectors. After 1984-85 and till 1991-92, the export potential of all agricultural sectors, non-metal mining, textiles, chemicals, fertilisers, petroleum products, machinery and transport equipment, electronic and communication equipments, electricity, other manufactruring , communication and other services sectors has increased. And after the major liberalisation of 1991-92 it is likely to grow in foodgrains, other crops, non-metallic mining, agro-based industries, textiles, chemicals, non-electric machinery, other manufacturing, communication equipments and other services sectors. We observe in this analysis that the export potential is likely to increase in fewer sectors after 1991-92 compared to the just preceeding period. As we can also observe from the forthcoming analysis on concentration of exports in next paragraphs.

5.2.2.2 Share of Various Sectors in Exports

The share of various sectors out of total exports provided by the whole economy over the years is presented in

3.5: Proportion of Exports Provided by Various Sectors Over the Years

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	0.026303	0.032234	0.011034	0.008897	0.007752
2	0.009995	0.004264	0.002227	0.012556	0.008078
3	0.001335	0	0.008239	0.012640	0.004097
4	0.048839	0.039041	0.044572	0.049085	0.045201
5	0.005217	0.002779	0.002822	0.002951	0.002014
6	0.016364	0.012158	0	0	0
7	0.000644	0.004707	0.016510	0.020385	0.016086
8	0.002018	0.000222	0.000232	0.000370	0.000198
9	0	0.133791	0	0	0
0	0.010900	0.007635	0.007407	0.004299	0.003221
1	0.008616	0.005174	0.007631	0.009176	0.007771
2	0.005422	0.002588	0.000634	0.000451	0.000485
3	0.000073	0	0	0	0
4	0.170277	0.130473	0.032039	0.023151	0.014650
5	0.039134	0.027746	0.027714	0.045927	0.045265
6	0.005891	0.002998	0.010244	0.016697	0.014384
7	0.002767	0.001403	0.000528	0.000729	0.000628
8	0.128880	0.045257	0.223803	0.118450	0.130821
9	0.002893	0.001369	0.000300	0.000522	0.000356
0	0.002178	0.001588	0.000528	0.000374	0.000255
1	0.054829	0.040086	0.036667	0.049926	0.053715
2	0.003747	0.003070	0.014410	0.023490	0.016029
3	0.004874	0.002049	0.002688	0.003960	0.002703
4	0	0.019798	0.011296	0.021334	0.011412
5	0.001686	0	0.000014	0.000033	0.000041
6	0	0.000003	0.000031	0.000021	0.000019
7	0.000117	0.000410	0.001376	0.000905	0.001084
8	0.010793	0.000119	0.001354	0.001499	0.001797
9	0.006721	0.053079	0.031399	0.054439	0.065222
0	0	0	0	0	0.000700
1	0.000304	0	0.103044	0.006161	0.003296
2	0.007608	0.004913	0.004810	0.003563	0.002521
3	0.017091	0.008800	0.001929	0.001936	0.001514
4	0.030800	0.000883	0.027763	0.027306	0.024166
5	0.021403	0.029516	0.010700	0.011980	0.009886
6	0.010562	0.012105	0.000526	0.000577	0.000456
7	0.003900	0.001225	0.007883	0.009177	0.007247
8	0.009972	0.019069	0.006955	0.006789	0.006344
9	0.005757	0.001269	0.010729	0.009915	0.035518
0	0.001602	0.001029	0.017934	0.132339	0.176590
1	0.126441	0.176052	0.018672	0.009800	0.015704
2	0.014243	0.018941	0.055661	0.045389	0.028543
3	0.019168	0.019658	0.000160	0.000151	0.000080
4	0	0	0	0	0
5	0	0	0.002021	0.001353	0.000721
6	0	0	0.235494	0.250560	0.233211
7	0.160615	0.132482			

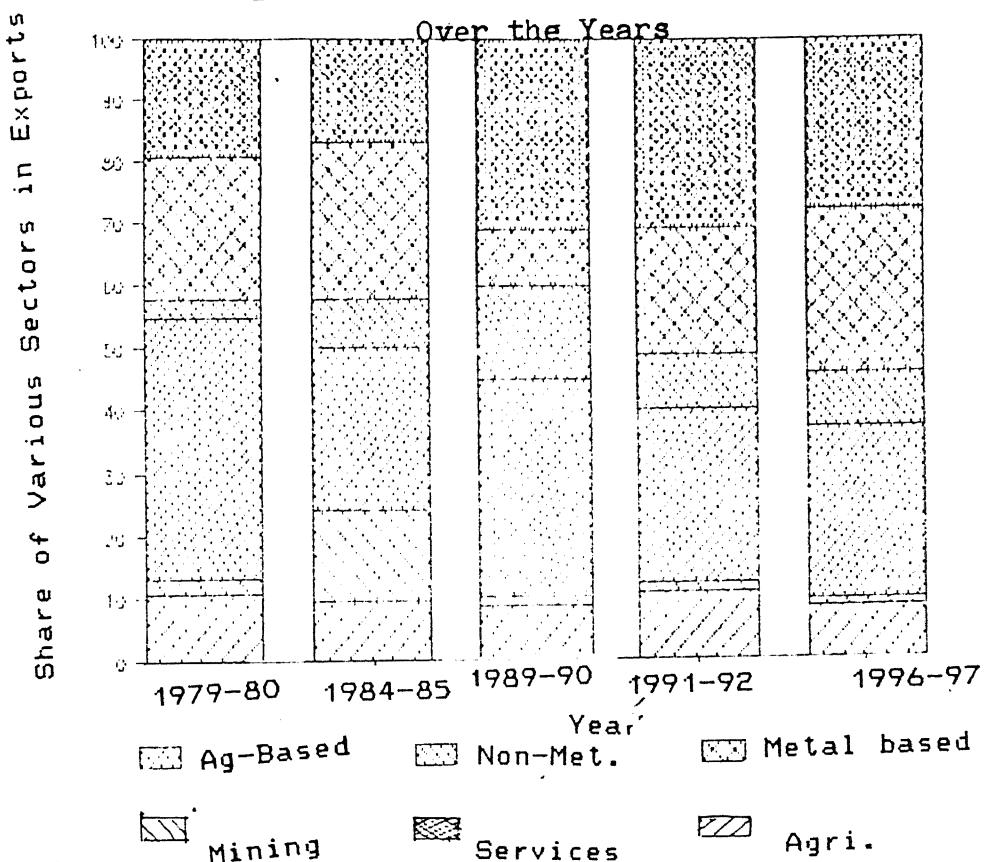
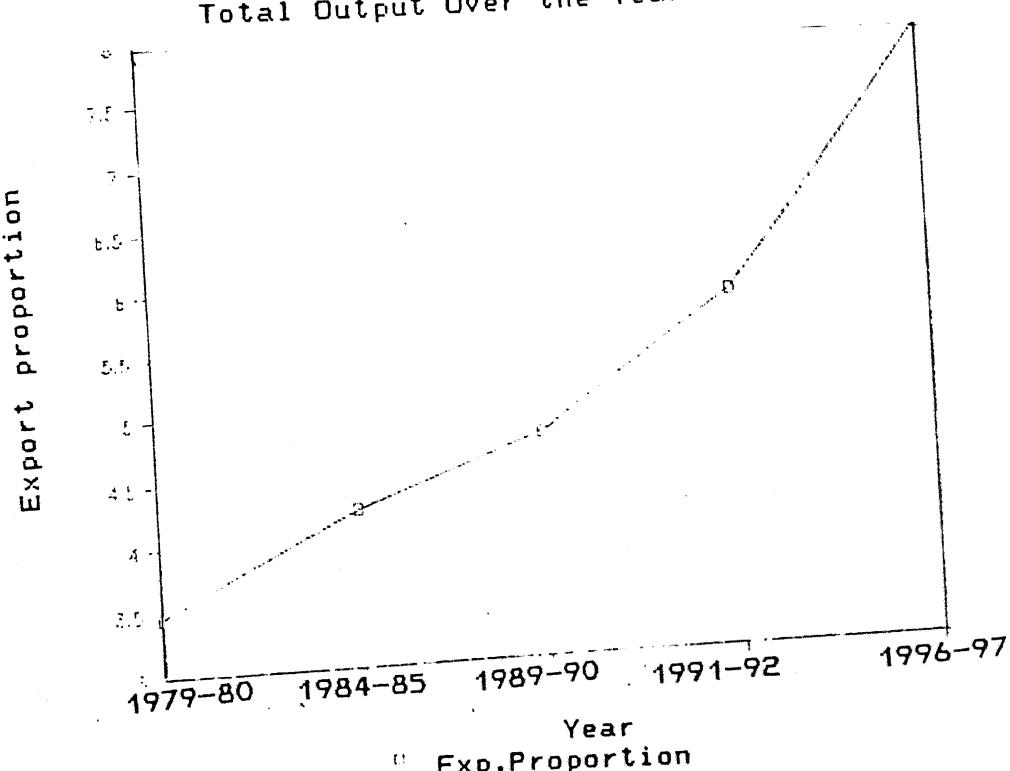
Fig 5.2 Structure of Exports**Fig 5.2 (a) Export Proportion out of****Total Output Over the Years**

Table 5.5. Fig. 5.2 also presents the comparative picture of temporal variation in export capability of various broad sectors. This table helps us to study the concentration of exports in the Indian economy over the years. From this table we observe that 5 to 6 sectors account for about two-thirds of the total exports in India during the whole period of the eighties and the early-nineties. There are only a few sectors which provide significant share (of about 5 per cent or more) in the total exports from India during this period.

The share of 12 sectors increased during the period before liberalisation and for 31 sectors ,the share went down. After 1984-85, i.e.,after the liberalisation of trade, albeit to a limited extent, the share of 26 sectors increased in total exports, while for 18 sectors, the share decreased till 1991-92. After 1991-92, i.e. ,after the major liberalisation, when the import duties were significantly reduced and the export subsidies were also withdrawn, the share of only 9 sectors are likely to go up, while for 31 sectors, the same may go down. This indicates that the export concentration is likely to increase in Indian economy after 1991-92. Let us study the main sectors which may be affected significantly in this process.

From Table 5.5 we observe that prior to 1984-85 the shares of foodgrains , fishing, machinery, chemicals and fertilisers sectors increased, while those of agro-based industries, mining, transport equipment sectors decreased. After 1984-85 and upto 1991-92, the shares of all agricultural sectors, chemicals ,fertilisers and service sectors increased in total exports, while the same for agro-based industries and machinery

sectors came down. But after 1991-92, other manufacturing and other chemicals sectors are likely to gain in terms of share in exports. While there is likely to be decline in shares of agricultural sectors, mining, agro-based industries, chemicals & fertilisers, machinery & transport equipment and services sectors. It shows that more sectors are likely to lose in shares of exports after liberalisation, while a few sectors are likely to gain in shares. It might be due to more specialisation required in exports as well as due to excessive international competition and non-tariff barriers in trade by some countries. Overall it may affect the export effort of the economy adversely in future, if more dependence is placed on a few items for exports. These are however the results based on direct linkages of exports for the concerned periods. We shall discuss the compound linkages based on the semi-closed Input-Output model incorporating trade in the latter part of this chapter in section 5.6.

5.3 Self-Sufficiency in Output

In this section we will discuss the self-sufficiency aspect of the economy. It is of importance to see whether the trade liberalisation is leading to increased or decreased dependency of the domestic economy on the foreign countries. Table 5.6 presents the self-sufficiency ratios for the various sectors during the period covering the eighties and the early nineties. By self-sufficiency we mean the ratio of domestic output to the total domestic demand excluding exports (as explained in section 2.6), thereby showing the capacity to

Table 5.6 : Self-Sufficiency ratios of Production for Various Sectors over the Various Years

Sec. Num.	1979-80	1984-85	1989-90	1991-92	1996-97
1	1.0098	1.0067	1.0013	1.0041	1.0063
2	1.0340	1.0097	0.9982	1.1378	1.1329
3	0.9950	1	1.1447	1.3640	1.1451
4	1.0193	1.0155	1.0238	1.0430	1.0643
5	1.0002	0.9958	0.9899	0.9944	0.9924
6	1.0590	1.1102	0.9668	1	1
7	1.0030	1.0390	1.1961	1.3282	1.3506
8	0.9775	0.9855	0.9327	1.0032	1.0026
9	0.1057	0.7104	0.2956	1	1.0000
10	2.9787	1.8804	2.5763	2.3327	2.7242
11	0.5096	0.3905	0.3656	1.2362	1.3405
12	1.0321	0.9803	0.9911	1.0018	0.9997
13	1.0003	1	1	1	1
14	1.0835	1.0558	1.0358	1.0234	1.0145
15	1.0497	1.0464	1.0452	1.0842	1.1190
16	1.0302	0.9946	1.0105	1.0327	1.0345
17	1.0420	1.0294	0.9883	0.9832	0.9839
18	1.3629	1.0760	1.5079	1.5787	2.0730
19	1.0097	1.0093	0.9945	1.0049	1.0040
20	0.9332	0.9101	0.9416	0.9541	0.9416
21	1.5130	1.4829	1.7908	2.3402	1.7777
22	1.0141	1.0030	1.1057	1.1533	1.1219
23	0.9322	1.0198	1.0399	1.0662	1.0541
24	0.7772	0.8373	0.9130	0.9513	0.8321
25	1.0177	1	0.9634	1.0008	1.0014
26	0.9159	0.7826	0.9419	1.0001	1.0001
27	0.9747	0.9558	1.0039	1.0390	1.0669
28	0.9733	0.8273	0.8027	1.0357	1.0263
29	0.8852	0.9571	0.9327	1.0797	1.1702
30	0.9054	0.9733	0.9994	1	1.0087
31	1.0109	1.0043	2.0044	1.0445	1.0316
32	0.8902	0.9388	0.8208	1.0069	1.0059
33	0.9661	0.8917	0.5789	1.0274	1.0290
34	0.9060	0.8257	0.6343	0.7056	0.6753
35	0.9805	0.9831	0.9341	0.9542	0.9288
36	1.0309	0.9893	0.9807	0.9874	0.9817
37	1.0302	1.0509	1.0003	0.9971	1.0033
38	0.8941	0.9329	0.8143	0.7675	0.7997
39	0.8336	0.7971	0.8332	0.7313	0.8893
40	1.2496	1.6263	0.9336	1.2000	1.6305
41	1.0382	1.0587	1.0786	1.0584	1.1568
42	1.0171	0.9650	0.9630	0.9514	0.9112
43	1	1	1.0002	1.0003	0.9989
44	1	1	1	1	1
45	1	1	0.9856	0.9793	0.9631
46	1.0217	1.0076	1.0379	1.0473	1.0581
Total	0.9976	0.9899	0.9756	1.0231	1.0352

fulfil the domestic needs in absence of foreign trade.

From this table we observe that at the overall level, the self-sufficiency ratio ,as defined above was less than 1 during the whole period of eighties. It indicates that there was deficiency to the extent of about 0.24 percent in gross output level during 1979-80. The level of deficiency increased during pre-liberalisation phase i.e. during the period 1979-80 to 1984-85 to 1.01 per cent. It further went up during the period 1984-85 to 1989-90, i.e. during the early post-liberalisation period to 2.44 per cent or the self-sufficiency ratio decreased further less than 1. After 1989-90 we observe that the self-sufficiency ratio has gone up beyond 1 in 1991-92. It is further likely to increase in future.

When we compare the self-sufficiency ratios (SSR) at the sectoral level during various periods ,we observe that the SSR increased in 15 sectors and decreased in 28 sectors during the pre-liberalisation period i.e. between 1979-80 and 1984-85. During this period the SSR was less than 1 in 18 sectors or alternatively, the domestic production was insufficient to meet the internal demand of the economy in case of products of 18 sectors. After mild level of liberalisation during 1984-85, we find that during the years 1984-85 and 1989-90, the number of production sectors deficient in meeting the domestic demand increased to 21 and 26 sectors respectively.During this period also in spite of liberalisation of trade to limited extent, the SSR decreased in 26 sectors and increased only in 17 sectors.During the whole period of eighties, most of the chemicals and fertilisers, petroleum based sectors and metal

based machinery, tools, transport equipment sectors were defficient in production to meet the domestic demand in the economy.

After major liberalisation i.e. since 1991-92, however, the scenario seems quite different. As we observe from Table 5.6, that during the period 1989-90 to 1991-92, the SSR increased for as many as 28 sectors, while it decreased in 16 sectors. As such during this period of only two years, we find that the number of defficient sectors came down to 12 from 26 during 1989-90. After 1991-92 it is likely that the SSR will be less than 1 in 13 sectors and during 1996-97 ,i.e. the post liberalisation period, the SSRs are likely to increase further for 19 sectors and to decrease for 24 sectors.

We also observe that while in the pre-liberalisation phase the sectors gaining in SSR were 3 from agriculture, 2 from mining,4 from chemical, petroleum based and 5 from machinery & transport equipment,other manufacturing sectors besides railway transport service. The agro-based sectors , fertilisers and pesticides lose in SSR during this period. After 1984-85 till 1989-90 some of the agro-based sectors and most in chemicals and fertiliser sectors gained in SSR. However during 1991-92 most of the agricultural , mining, agro-based and chemical, petroleum based, and some iron and steel based sectors gained in SSRs. After 1991-92 the SSRs in textiles, non-metallic minerals , transport equipment sectors and some chemical sectors are likely to go up. Further we observe that while most of the chemical, petroleum based and machinery and transport based sectors were defficient till 1989-90, only a few of them remain defficient

after 1991-92. On the other hand in case of the service sectors, while most of them were self-sufficient till 1989-90, after 1991-92, other transport service, electricity and communication service are likely to become deficient in capability to meet the domestic demand. This seems to be due to the integration of the Indian economy with the world economy and the technological aspect. It may also be due to growing emphasis on exports and increasing import intensity of exports since the liberalisation phase of trade. Overall however, it can be realised from the above analysis that the self-sufficiency of the economy as a whole is going up in the recent past and it is further likely to go up in the next few years.

5.4 Structure of Production

The structure of production as observed from the I-O tables for the various periods is presented in Table 5.7. From this table we observe that during the period 1979-80 to 1984-85, i.e., the pre-liberalisation phase, the shares of foodgrains and fiber crops, mining sectors increased among the primary sectors. The shares of animal husbandry, fishing, forestry, other crops went down during this period. Among the non-metal based secondary sectors, the shares of food products, cotton and woollen textiles, wood products went down besides most of the fertilisers and chemical sectors. The shares of only petroleum products, coal tar products and other chemicals registered increases during this period. From the metal based manufacturing sectors the shares of all sectors except other non-metallic and mineral products, non-ferrous metals and other manufacturing sectors went up. And

**Table 5.7 : Share of Various sectors in Gross Output
at Constant Prices Over the Years**

Sector Number	Share of Various sectors in Gross Output During				
	79-80	84-85	89-90	91-92	96-97
1	9.473	10.08	8.487	7.912	6.891
2	0.859	0.896	1.082	0.604	0.540
3	0.910	0.317	0.307	0.276	0.254
4	7.057	6.465	7.911	6.454	5.598
5	4.611	4.449	5.231	4.294	3.957
6	0.750	0.460	1.204	1.252	0.855
7	0.496	0.461	0.473	0.480	0.484
8	0.637	0.841	0.795	0.673	0.599
9	0.238	0.882	0.527	1.090	1.302
10	0.058	0.069	0.057	0.044	0.040
11	0.165	0.237	0.264	0.280	0.246
12	0.876	0.725	0.695	0.837	0.782
13	0.916	0.871	0.319	0.203	0.173
14	4.788	4.670	3.606	3.735	3.165
15	3.340	2.592	2.935	3.383	3.281
16	0.286	0.867	2.734	2.142	2.330
17	0.250	0.123	0.263	0.232	0.247
18	1.782	2.404	3.102	1.816	1.928
19	0.922	0.525	0.408	0.620	0.688
20	0.844	1.069	1.002	0.794	0.812
21	0.559	0.513	0.385	0.508	0.963
22	0.724	0.584	0.650	0.968	1.074
23	0.403	0.309	0.179	0.276	0.337
24	1.241	2.302	2.554	2.592	2.309
25	0.272	0.404	0.281	0.227	0.224
26	1.331	1.026	1.253	1.068	1.009
27	0.121	0.111	0.167	0.140	0.136
28	1.790	0.394	0.442	0.253	0.549
29	0.856	2.490	2.729	3.026	3.165
30	0.260	0.240	0.521	0.590	0.634
31	1.535	1.193	0.938	0.681	0.770
32	1.788	3.980	1.938	3.000	3.356
33	2.111	0.964	0.268	0.423	0.421
34	1.900	2.044	1.669	2.098	2.216
35	0.810	1.416	1.581	1.754	2.018
36	0.300	0.343	0.584	0.963	0.909
37	0.949	1.206	0.927	1.017	1.350
38	0.460	0.629	0.524	0.493	0.572
39	0.178	0.340	0.699	0.783	1.523
40	1.907	1.493	2.640	2.548	3.079
41	1.084	1.448	1.208	1.035	0.908
42	4.214	4.530	3.866	3.896	4.210
43	2.052	1.979	2.669	2.718	2.887
44	8.714	7.887	6.298	6.262	5.828
45	0.449	0.466	0.387	0.463	0.467
46	24.71	22.67	23.21	25.10	24.91
Compl.					
Imp.	3.124	3.825	4.886	4.805	5.152
Total	100	100	100	100	100

Compl. Imp. = Complementary Imports

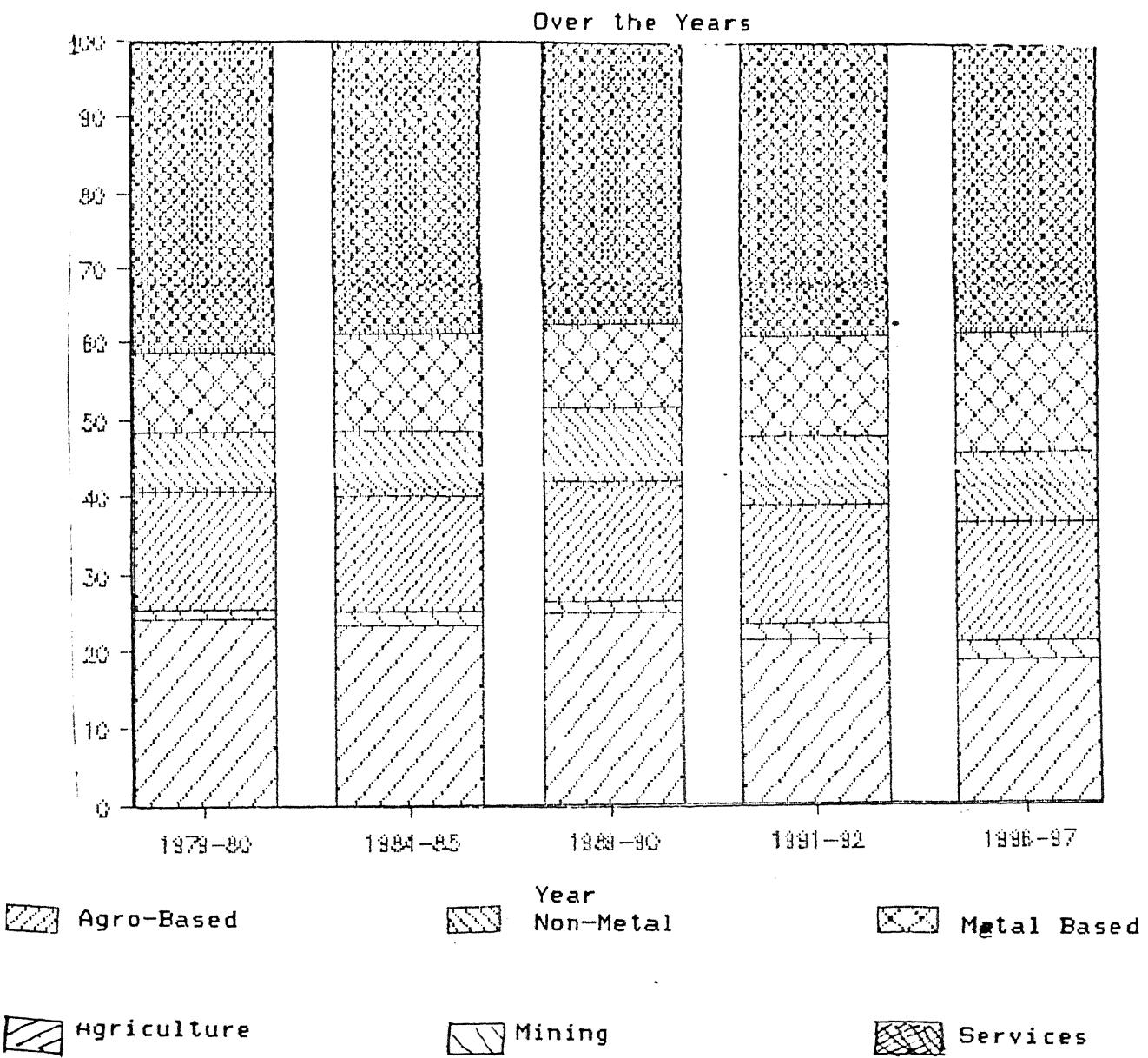
among the services ,the transport and communication services gained while others lost their shares. From this analysis we find that the sectors providing goods for exports or basic inputs e.g. textile products, petroleum products, other chemicals machinery and transport equipment & services, and communication sectors gained during this period. Most of these sectors provide output for exports or inputs for the modern manufacturing sectors.

During the period of mild liberalisation of trade i.e.,during 1984-85 to 1991-92, we observe that out of the primary sectors, only forestry, fishing, crude petroleum & natural gas and non-metallic & minor minerals sectors gained in terms of the share out of the total output. Among the agro-based industries, sugar, textiles and wood products sectors gained while gur and khndasari, other food products, textile products and paper & paper products based sectors lost in their respective shares. Out of the fertilisers, drugs and chemical based sectors, leather, plastics, coal tar products and synthetic fibre & resin sectors lost in their shares while the other sectors gained. Among the metal based manufacturing sectors, other non-metallic mineral products, iron and steel and non-ferrous metals, rail equipment sectors lost in shares while other sectors gained. And from the services, except electricity and other services all sectors lost in their shares. This shows that after the mild liberalisation of trade the sectors based on processing rather than on raw material gained in comparative importance.

Finally during the period after major liberalisation, i.e from 1991-92 to 1996-97, it is likely that out of the primary sectors only fishing and crude petroleum and natural gas

sectors will gain and all other sectors will lose in terms of shares. Among the agro-based sectors, the textile sectors except cotton textiles, wood products, paper and paper products, textile products sectors will gain while sugar and other food products, cotton textiles sectors will lose in shares. From the drugs and chemicals based sectors we observe that other chemicals, cement, leather products, plastics, rubber products sectors will gain while fertilisers, pesticides, synthetic fibre and resin, petroleum products, coal tar products sectors will lose. In the metals and machinery sectors all except the other non-metallic mineral product sector will gain in shares during this period. Among the services the other transport, electricity and communication sectors will gain while rail transport, construction and other services will lose in shares. Thus we observe that after the major liberalisation the primary sectors and agro-based sectors , the sectors providing inputs to agriculture e.g. petroleum products,fertilisers and pesticides will lose in terms of their shares while the machinery and transport equipment based sectors, rubber, plastics, leather, other chemicals, electricity and communication sectors will gain. The above comparision can also be made with the help of the Fig. 5.3, which presents the distribution of output among the broad sectors over the different periods.

The above analysis shows that the modern sectors and non-agro-based sectors will gain in importance at the cost of traditional sectors e.g.,agriculture , mining, cotton textiles, some of the labour intensive service sectors like construction and other services. This analysis is however based on the direct

Fig 5.3 Structure of Production

shares and not on the basis of the semi-closed model, which will be presented latter in terms of backward and forward output linkages.

5.5 Factors of Growth in Indian Economy

Besides the structure of production, it is important to study the factors behind the growth in various parameters in the economy during the different policy regimes. In this analysis, the factors for growth of output, employment and income generation in the economy need specific attention during the period of changes in policy with regard to foreign trade. The important factors guiding growth in output and income may be considered as the following.

- (i) Growth in Final Demand (FDG);
- (ii) Growth in Exports (EG);
- (iii) Import Substitution (IS); and
- (iv) Technical Change (TC) .

For growth in employment , besides the above four factors, another may be added viz., growth in labour productivity. If there is a growth in labour productivity (LPG) , the employment generation is adversely affected as there is inverse relationship between employment and labour productivity. So if there is growth in labour productivity in certain sectors / economy due to any reason, decline in employment may be expected. As such LPG may be taken as one of the factors for growth/ decline in employment in any sector/ economy. Let us first examine the factors for growth in output for study.

5.5.1 Factors of Growth in Output

The study of factors of growth in output and other parameters of the economy e.g. employment and income generation has been done in I-O frame-work for the three periods viz., pre-liberalisation phase (from 1979-80 to 1984-85) ; mild liberalisation period (from 1984-85 to 1989-90) ; and for the period covering post major liberalisation phase (1991-92 to 1996-97). The shares of various factors of growth in output as enumerated above during these three periods for different sectors and for the overall Indian economy have been presented in Tables in appendix 5A.1, 5A.2 and 5A.3 respectively . We observe from Table 5A.1 that during the first phase i.e. from 1979-80 to 1984-85, the most important factor for growth in output in the economy was the growth in final demand. At the overall level it contributed more than the total effort for growth in output (i.e. 103.77%) during this period, while the other three factors put together contributed in negative (to the extent of about 3.77%). The growth in exports contributed positively for growth of output to about 11.12% . However import substitution and technological change contributed in the negative for the growth of output during this period.

With regard to specific sectors in which the growth in output was affected postively/negatively due to different factors, during this period ,the analysis is presented below.

Factor	Sectors with Positive Effect	Sectors with Negative Effect
(i) FDG	Foodgrains, Fibre Crops, Tea & Coffee, Non-Met. Minerals, Food Prod., Cotton, Syn., Silk Text., Tex. Prod, Paper, Plastic, Petro. Prod., Coal Tar Pro., Mach., Tpt. Eqpts., All Services sectors. (in all 23 sectors)	All Agri. Sectors except Foodgrains, Tea & Coffee, Fibre- Crops, Iron Ore, Cement, Woollen Text., Wood Prod., Leather Pro. Fert., Pest., Syn. Fibre, Other Mfg. Ind. (in all 17 sectors)
(ii) EG	All Agri. except Fibre All mining, Other Food Prod., Cotton Text., Rubber, Plastic, Petro. Fert., Pest., Chemicals Machinery, Metal Prod., All service sectors. (in all 22 sectors)	Fibre Crops, Sugar, Khandsari, Wooll- en, Syn. Text., Text. Prod., Rail, Other Tpt. Eqpts. (in all 8 sectors)
(iii) IS	Fishing, Coal, Crude Mining, Cement, Other Mfg. Sectors. (in all 5 sectors)	Other Non-Met. Min- erals, Iron Ore, All Food Prod., Cotton Text., Text. Prod., Rubber, Plastic Pro. Fert., Non-Met. Min. Rail Eqpts., other

100
Tpt. service, other

service sectors

(in all 14 sectors)

(iv) TC	Other Crops, Animal Husb., Fishing, Other Non-Met Minerals, Other Food Prod. Petro. Prod., Chem., Cement Iron & Steel, Mach., Tpt. Eqpts., Other Mfg. Elect. Communication service sectors.	Coal, Met. Mining, Cotton Text., Lea- ther, Rubber, Plastic Paper, Fert., Pest., Non-Met. Min. Prod., Railway and Other Tpt. Ser. sectors Construction, Oth. Service sectors.
	(in all 17 sectors)	(in all 14 sectors)

After observing the behaviour of factors affecting the growth in output during the period 1984-85 to 1989-90, at overall economy level, from Table 5A.2 we find that the share of growth in final demand was almost at the earlier level, while, the share of export growth reduced to about 10%, that of import substitution grew more in the negative and that due to technological change became less negative. While prior to the mild liberalisation of trade, the net stimulus of change in foreign trade was positive (4.4 %), after 1984-85, the same became almost balanced to zero. It also indicates that the net stimulus due to technological change also became less unfavourable after mild liberalisation of trade. At the sectoral level not much change was observed in the direction of effect due to various factors, compared to that observed earlier except that the number of sectors positively affected due to FDG, EG and IS

grew while the same for IS fell marginally . For details, the appendix Table 5A.2 may be referred.

The shares of various factors in output growth during the post liberalisation phase , i.e. after 1991 are presented in Table 5A.3. The shares during this period are qualitatively different compared to those before liberalisation of trade. During this period we observe that the share of growth in final demand is only about two-thirds compared to more than 100% prior to 1984-85. On the other hand the share of growth in exports has increased to about one-fifth from less than ten percent in the previous period. Similarly the shares of import substitution and technological change have also become positive during this period. When we analyse the effects in different sectors we observe that output in all sectors is positively affected due to growth in final demand and in all but one sector (except tea & coffee sector) it is positively affected due to growth in exports. While the share of IS effect in growth in output at overall level is about 5% (positive), the output in a few sectors is negatively affected e.g. tea & coffee, crude petroleum, rubber prod.,petroleum products , while most of the other sectors are positively affected although to a limited extent. With regard to the share of TC in growth of output, the sectors positively affected are tea & coffee, crude petroleum, other non-metallic minerals, sugar, wood prod., leather, rubber, plastics,petroleum prod.,synthetic fibres and resin, metals, machinery, motor vehicles,other transport and electronic and communication equipments, other transport service and communication service etc. On the other hand the sectors receiving negative effects in terms of output due to TC are fibre

crops, other crops, forestry, coal mining, gur & khandsari, other food products and rail transport service sectors.

From the above analysis we understand that the trade liberalisation has caused positive effect on the growth in output in the economy due to all the four factors of output growth. Further we observe that the exports are becoming much more effective for most of the sectors though to varying extent compared to import substitution for growth in output in the domestic economy. Import substitution is also contributing positively to the output at the overall level and technological change factor also becomes supportive in growth effort in the economy in general and in the sectors particularly important for exports and those based on modern technology. Thus the trade liberalisation seems to have affected the economy in a very positive way at the overall level. It also indicates that the import substitution is also effective in the liberalised trade scenario and the new and modern technology can positively contribute for growth in output in the conditions of liberalised trade.

5.5.2 Share of Various Factors in Growth of Income

The growth of income is very important in any economy particularly , a poor and malnourished country like India. In this sub-section we shall analyse the shares of various factors in growth of income in the Indian economy during the above mentioned three periods. The factors taken into consideration are same as for the study of effects in growth of output. These

are presented in the appendix Tables 5A.4 to 5A.6 respectively for the three periods covering pre-liberalisation, mild liberalisation and the major liberalisation phase. Let us first discuss the position as observed during the first phase.

From the Table 5A.4 we observe that during the period 1979-80 to 1984-85 , i.e. the pre-liberalisation phase, the growth in final demand (FDG) factor was most important for the growth of income generation in the Indian economy at the overall level (i.e. about 95 % share in total income -growth). The other factor which positively affected income-growth was export-growth (EG) with about 13 % share. The other two factors ,i.e. the import substitution (IS) and technological change (TC) contributed in negative for income-growth at the overall level (both to the extent of about -4 % each). Thus the net share of foreign trade in income-share was about 9% . At the sector level we observe that the shares of FDG are positive in 36 sectors while negative in the rest,viz. other crops, animal husbandry, fishing, forestry, iron ore,woollen textiles, wood products, leather products, cement and other manufacturing sectors. In case of the EG factor the income-growth was positively affected in 40 sectors, while in remaining 6 viz.,gur and khandsari ,sugar, silk and synthetic textiles, textile products, rail and other transport equipments the effect was negative. However for the factors IS and TC the majority of sectors had negative shares in income-growth during the pre-liberalisation phase. While for IS there were 16 sectors which had positive shares, in case of TC factor there were 21 such sectors. For IS factor ,some of the agricultural sectors ,metallic and non-metallic mining, food products, textiles, non-electric machinery, equipments and the

service sectors had negative shares. For the TC factor on the other hand the sectors providing negative shares in income-growth were foodgrains, tea & coffee, forestry, coal and crude mining, sugar, gur & khandsari, drugs, fertilisers & chemicals , transport, electricity and other service sectors.

Let us now examine the shares of various factors in income-growth during the mild liberalisation phase, i.e. during 1984-85 to 1989-90. The appendix Table 5A.5 shows that at the overall level the share of FDG factor has increased to over 102 % during this period from about 95 % during the period before 1984-85. But the share of EG factor has come down to about 9 % as against about 13 % during the pre-liberalisation phase. While the share of IS factor has also declined to -7.8% (down from about -4.2 % in earlier period), for the TC factor the share has remained almost at the previous level -4.28 %. Thus the combined share of foreign trade (export growth and import substitution put together) in income-growth decreased from the previous level and was very marginal although positive during this period.

At the sectoral level we observe that the share of FDG factor was positive in 40 sectors excluding the iron ore, gur & khandsari, plastic products, coal tar products, fertilisers and non-ferrous metal sectors. The number of such sectors declined compared to that in the earlier period. For the EG factor, in case of 9 sectors, the shares were negative. These sectors are foodgrains, forestry, crude petroleum and natural gas, sugar, gur & khandsari, other food products, iron & steel, motor vehicles, and other manufacturing sectors. We observe that most of these sectors are primary, agro-based or unorganised sectors.

With regard to the IS and TC factors we observe that although at the overall level these factors are contributing in the negative for income-growth but at the sectoral level, the shares were positive during this mild liberalisation phase for comparatively more number of sectors as against during the earlier phase. For IS factor, most of the machinery, transport, other equipment-based sectors and service sectors had negative shares in income-growth. While for the TC factor, some primary sectors, agro-based sectors, machinery sectors and service sectors had negative shares in the same. Overall 22 and 25 sectors respectively had positive shares in income-growth for IS and TC factors during this period. Thus we find that there was growth in income intensity in many sectors due to import substitution and technological change, but at the overall level it was not significant during this period.

Now let us study the shares of various factors in income-growth during the post liberalisation period i.e. after 1991-92. We observe from appendix Table 5A.6 that there is very significant change in income shares during this period compared to the earlier periods. During this period the share of FDG factor has come down to about two-thirds from about 102 % during the earlier period. The shares of all the other factors, i.e. EG, IS and TC have increased significantly. For EG the share has gone up to over 20 % from the earlier 9 % , in case of IS and TC factors, the shares have become positive (about 6 % and 5 % respectively) while earlier these were negative. Thus after the major liberalisation all the factors are positively contributing towards income-growth.

At the sectoral level we observe that for FDG factor all the sectors contribute positively for income-growth, while earlier there were 6 sectors contributing negatively prior to the major liberalisation policy of 1991. There are 14 sectors which have predominantly large share (more than 75 %) due to FDG in income-growth, while another 30 sectors have significant shares. The sectors which do not contribute significantly are only synthetic fibre & resin and electronic and communication equipment sectors. With regard to the factor EG also all sectors except tea & coffee sector contribute positively towards income-growth and 16 sectors have significant share. These sectors are fibre crops, forestry, fishing, coal, iron ore, cotton textiles, textile products, leather products, rubber products, pesticides, other chemicals, non-ferrous metals, rail transport equipments, electronic and communication equipment, other manufacturing, rail transport service sectors. Thus we find that the exports also positively help in employment generation in many sectors after liberalisation of trade.

With regard to the factors IS and TC also we observe that the number of sectors having positive share in income-generation have increased to 32 and 27 sectors respectively during this period compared to 22 and 25 sectors during the earlier period. We find that for the IS factor most of the textile sectors, manufacturing and service sectors have positive shares while only tea and coffee, animal husbandry, forestry, crude petroleum , food products, paper, leather, rubber and petroleum products sectors have negative shares in income-growth. In case of TC effect also we observe that except some of the

5.5.3 Factors for Growth in Employment

For a labour surplus country like India, it is crucial to generate additional employment in the economy. It is therefore very important to know which factors are positively affecting employment and also the ones which are adversely affecting the same in the economy during different policy regimes. We shall discuss here these effects for the five factors as enumerated earlier, over the above three periods as for growth in output. The shares of various factors in growth of employment during these three periods are presented in appendix Tables 5A.7, 5A.8 and 5A.9 respectively.

From the Table 5A.7 we observe that at the overall economy level the factors which are most important for variation in employment are the growth in final demand (for growth in employment) and the growth in labour productivity (for decline in employment). Among the other factors, export growth has significantly positively affected employment generation during the period 1979-80 to 1984-85, i.e. the pre-liberalisation phase. The import substitution has very adversely affected the employment. Together the export growth and import substitution have very negligible effect on employment growth during this period. The technological change factor has negatively affected employment generation though at less significant level during this period.

The behaviour of various factors (positive and negative effects) on growth in employment as observed for

different sectors in the economy during the period 1979-80 to 1984-85 is presented below.

The Effect on Employment by the Different Factors in Various sectors during 1979-80 to 1984-85

Factor	Sectors affected	
	Positively	Negatively
LPG*	Tea & Coffee, Forestry Cotton Text., Wool. Text. Rubber and Wood Prod., Fert., Pest., Cement, Non-Met. Min. Prod., Non- Ferrous Metals,, Cement, Other Manuf. Constn.,	Foodgrains, Fibre Crops, Other Crops, Fishing, All Mining, Syn., Silk Textiles, All Food Prod., Textile Prod. Coal Tar, Petro. Prod., Tar Prod., Other Chem., Iron & Steel, Machinery Motor Veh., Other Trans- port Eqpts., Electronic- Commn. Eqpts., Commn. ser.
	(in all 15 sectors)	(in all 31 sectors)
FLG	Foodgarins, Fibre Crops, Tea & Coffee, Coal, Crude Non-Met. Mining, Food Prod. Cotton Text., Paper, Rubber Petro., Plastic Products, Drugs, Chem., Fert., Pesti- cides, Other Non-Met. Min.	Other Crops, Animal Hus., Forestry, Fishing, iron Ore, Silk, Synthetic Tex. and Prod., Wood Products, Cement, Other Mfg. (in all 11 sectors)
	Prod., Iron & Steel, Mach., Non-Fer. Metals, Rail and Other Tpt. Eqpt., Electro-	

Commn.Eqpts.,All Service

sectors.

(in all 35 sectors)

Foodgrains, Tea & Coffee,	Fibre Crops, Sugar,
Other Crops, Animal Husb.	Gur,Khand.Woollen and.
Forestry,Fishg,All the	Silk,Synth.Text.,Text.Prod.
Mining sectors,Other Food	Non-Fer.Metals, Rail,Other
Prod.,All Text.,except Cotton	Transport Equipments

Paper,Rubber,Wood and	sectors
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Leather Pro., Fertilisers	(in all 9 sectors)
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Coal Tar Prod.,Pesticides,	
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Other Chem.,Cement,Non-Elec.	
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Mach.,Motor Veh.,Other Mfg.,	
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Other Service sectors.	
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(in all 37 sectors)

Forestry, Fishing,Coal,Crude	Foodgrains, Fibre,Other
Mining,Plastic,Petroleum ,	Crops,Tea & Coffee,Animal
Prod.,Other Chemicals,Iorn	Husb., iron Ore, Non-Met.
& Steel,Motor Veh.,Other	All Food Prod.,All Text.,
Transport Eqpts.,Other Mfg.,	Leather,Rubber,Wood Produ
Sectors	Fertilisers,Pesticides,

(in all 13 sectors)

Synth.Fibre and resin,	
Non-Met.Min.Prod., Non-	
Elect.,Elect.Mach.,Rail	
Tpt.,Electronic and Commn	
Eqpts. and all service se	

(in all 33 sectors)

TC	Other Crops, Animal Husb., Fishing, Non-Met.Mining, Other Food Prod., Woollen Text., Prod., Wood Prod., Petro.Prod., Other Chemicals, Cement, Iron & Steel, All & Equipments, Electricity and Communication sectors	Foodgrains, Tea & Coffee, Other Crops, Forestry, Crude, Iron Ore Mining, Gur & Khandsari, Cotton, Synth. Text., Leather, Paper, Rubber, Plastic, Prod., Non-Fer. Metals, service ,Construction and Other service sectors.
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(in all 20 sectors)

(in all 26 sectors)

* here the positive effect on employment is achieved due to decline in labour productivity and negative effect due to growth in it.

From the above analysis we find that the decline in employment generation was caused by growth in labour productivity in many sectors (mostly the modern sectors). However in traditional unorganised sectors and in those in which the effect of Research and Development (R & D) was not adequate the employment grew due to decline in labour productivity. The growth in final demand helped employment generation in many sectors except those which were mainly export-oriented sectors. The export growth positively helped in employment generation in some export-oriented primary sectors, chemical based and other manufacturing sectors etc. However it also negatively affected some primary sectors like tea & coffee, animal husbandry, forestry, fishing etc. Import substitution positively affected employment in some export-oriented sectors while negatively

affected more comparatively modern sectors. The technological change adversely affected employment in 27 sectors but in case of modern and export oriented sectors, this factor has also affected employment in positive way.

After the mild level of trade liberalisation during 1984-85, we observe from the Table 5A.5 that the overall effect of growth in labour productivity and final demand remained in the same direction but to marginally less extent than in earlier phase. The effect of growth of exports become more positive, while the adverse effects on employment generation as a result of import substitution and technological change factors comparatively decreased. The effects of various factors have changed their direction after 1984-85 for many sectors from positive to negative and vice versa as given below.

The Effect on Employment Changed During 1984-85 to 1989-90

Factor	The Sectors in Which Change is	
	From Negative to Positive	From Postive to Negative
LPG	Tea & Coffee, Other Crops, Crude Petro.Mining,Sugar, Gur & Khandsari,Other Food Prod.,Paper Prod.,Iron & Steel, Motor veh.,Other Tpt.Eqpts., Electricity.	Animal Husb.,Fishing, All Textiles,Wood prod., Coal Tar Prod.,Synth. Fibre & Resin,Non-Met.Min.Prod., Non-Fer.Metals.
FDG	All Textiles except Cotton and Wood Products.	Gur & Khandsari,Other Food Prod.,Rubber prod.,Fertilisers.

EG	Animal Husb., Fishing, Coal Tar Prod., Cement, Other Tpt.Eqpts.	Foodgrains,Fibre Crops, Crude Petro.Mining,Wool- len Text.,Iron & Steel, Transport Eqpts.
IS	Sugar, Other Food Prod., Cotton ,Woollen Text., Paper,Rubber,Coal tar Prod.,Fert.,Non-Met.Min. Prod.,Non-Fer.Metals, Electro-Commn.Eqpts., Rail Tpt.ser., Other Service.	Fiber Crops,Tea & Coffee Coal,Crude,Iron Ore Min- ing,Leather prod.,Other Chem.,Cement,Iron & St., Elect.mach.,Motor Veh., Other Tpt.Eqpts.
TC	Foodgrains,Coal,Sugar, Gur & Khandsari,Cotton Text.,Text.prod.,paper Prod.,Plastics,Fertiliser Pesti.,Otherchem.,Other Tpt.Service	Fibre Crops, Art Silk & Syn.Text.,Wood Prod.,Lea- ther prod.,Petro.Prod., Cement,Iron & Steel,Non- Elect.Mach.,Tpt.Eqpts., Other Mfg.and Commn.serv.

From the above analysis we observe that the labour productivity has increased in most of the sectors after 1984-85, as such the employment intensity has come down in those sectors. The final demand effect has been positive in all except 5 sectors viz., iron ore, non-metallic mineral, leather products, coal tar products and other transport equipments during this period. The effect of growth in exports has become negative in comparatively more sectors during this period. However the

effect of import substitution and technological change has become positive in many more sectors compared to the earlier period. It shows that the import substitution is more effective in liberalised trade scenario because of easy availability of various raw materials and semi-finished goods. Similarly the technological change also becomes more favourable to employment generation in the environment of liberalised trade.

Now let us examine the shares of effects due to various factors on employment during the period after the major liberalisation of trade i.e. after 1991-92. The appendix Table 5A.6 presents these shares. From this table we observe that there is significant difference in the employment effects after the major trade liberalisation. While earlier the negative effect of growth in labour productivity (LPG) on employment was comparatively less effective than the positive effect due to growth in final demand (FDG), the position has reversed after 1991-92. Further the share of growth in exports (EG) has become much larger (about 69 % as against 27 % before 1991-92) compared to the mild liberalisation phase. Further it is most significant to note that the shares of import substitution (IS) and technological change (TC) in growth of employment at the overall level have become positive and significant after 1991-92 while they were negative during the earlier phases. Thus we observe that all the factors except the LPG (which is by the very nature against it), are contributing positively for the employment growth in the liberalised environment. Now let us examine the effects in particular sectors.

We observe from the Table 5A.6 that the LPG factor is negatively affecting the growth of employment in 37 sectors (larger as compared to the previous periods) and in only 9 sectors, it is in the other direction, viz., forestry, crude, non-metallic minerals, sugar, gur and khandsari, textile products, fertilisers, pesticides and construction sectors. As we can see most of the sectors, in which the LPG has been negative are less modernised and Government protected/controlled sectors. With regard to the FDG, we find that all the sectors are positively affected in terms of employment growth by this factor during this period, while earlier 5 to 6 sectors were contributing negatively through FDG. In case of EG factor also while earlier about a dozen sectors were contributing negatively for growth in employment, after 1991-92, there is only one such sector, viz. tea & coffee. While all other sectors are contributing positively and 34 of them are contributing significantly (over 20 %) for the overall employment-growth.

When we examine the shares of IS and TC factors in employment-growth during the post liberalisation period, we observe that a majority of sectors are contributing positively, while during the earlier periods, the position was reverse. The shares of IS factor are positive in case of 32 sectors and negative in the rest, viz., tea & coffee, animal husbandry, forestry, crude petroleum mining, food products, paper, leather and plastic products, petroleum products, non-metallic mineral products, non-electric machinery and other transport service sectors. Most of these sectors are un-organised and/or in the public sector. Out of these in 9 sectors the negative effects

have been significant. For TC factor, the shares are positive in 27 sectors and negative in the other 19 (out of which the shares are significant in 11). The sectors in which the shares are positive are tea & coffee, animal husbandry, crude petroleum mining, non-metallic mining, sugar, cotton textiles, wood products, leather, rubber, plastic, petroleum products, fertilisers, drugs, chemicals, all metal products and machinery sectors, all equipments except rail equipments, other transport service, electricity and gas, communication service sectors. It may be noted here that during this period there were maximum number of sectors (20) in which overall employment declined, while in the earlier periods such sectors were about a dozen. Thus we find from the above analysis that the growth in labour productivity is the inhibiting factor for the growth in the employment potential in the economy. For this, efforts need to be concentrated on Research and Development in designing of equipments and machinery so as to reduce capital intensity and increase labour use without significant adverse effect on overall output and efficiency.

5.6 Direct,Indirect Linkages

So far in this chapter we have analysed the various effects with the help of the direct linkages only. For these we have taken the open Input-Output model and the technical coefficients into consideration. For studying the factors of production also the effects were analysed with the help of total direct input-output coefficients and the imports and exports were considered in the final demand. However as we have discussed earlier in chapter 2, that all imports are not undesirable and as

the imports are used in the production process , they provide forward linkages to the domestic economy, while their backward linkages are not available to it. Similarly although the exports do not directly provide any forward linkages for production, they do provide backward linkages to the domestic production sectors. Further when we analyse the backward/forward linkages of production for the various sectors in the economy, if we do not segregate imports, we over/under estimate these linkages. So to provide the appropriate estimates of multipliers/linkages, the semi-closed I-O model has been used. This model not only provides the direct,indirect linkages of various entities like imports, exports,output,labour and income, but also provides induced linkages due to the foreign trade. As the exports provide for the purchase of imports, exports also indirectly help in production process through creation of additional demand for inputs and value added. In this section ,we shall discuss the direct,indirect and induced linkages of various parameters during the different phases in the economy with respect to the trade policy regimes.

5.6.1 Import Intensity

The direct, indirect and induced backward import linkages of various sectors and exports are treated as overall import intensity in the economy. For this analysis, we have compiled the estimates of backward import multipliers of various sectors and exports in a semi-closed I-O model as described in chapter 2. By backward import multiplier of a sector or exports (as defined in chapter 4) by we mean `the value of complementary imports needed to produce one unit value worth of output in the

concerned sector or exports'. These estimates for the years 1979-80, 1984-85, 1989-90, 1991-92 and 1996-97 are presented in Table 5.8 to study and compare the compound import-intensity of the economy over the years. It will provide us the information about whether the import dependence of various sectors and the economy as a whole has increased or decreased with the liberalisation of trade or not and if yes to what extent ?

When we compare the position at the overall economy level, we can also observe from Fig. 5.4 that the import intensity was decreasing during the pre-liberalisation phase (due to strict control on imports), but after the mild level of liberalisation of trade during 1984-85, it started increasing. It increased till 1989-90 and came down during 1991-92 quite significantly (may be due to shortage of foreign exchange and resultant cut on imports) , but since 1991-92 ,i.e. after the major liberalisation of trade, it has again started increasing. But the overall import-intensity comparatively is lower after 1991-92 than that obtained during the pre-liberalisation phase as measured with the help of compound import linkages. In these estimates the import-intensity of complementary imports only is estimated, while the competitive imports ,which are primarily procured to meet the final demands and are not of essential or regular nature are not included. Thus we find that the import requirement of essential nature is likely to remain comparatively lower after the liberalisation of trade.

At the sectoral level we observe that during the pre-liberalisation phase also the import intensity had increased in equal number of sectors as it came down in. It decreased in

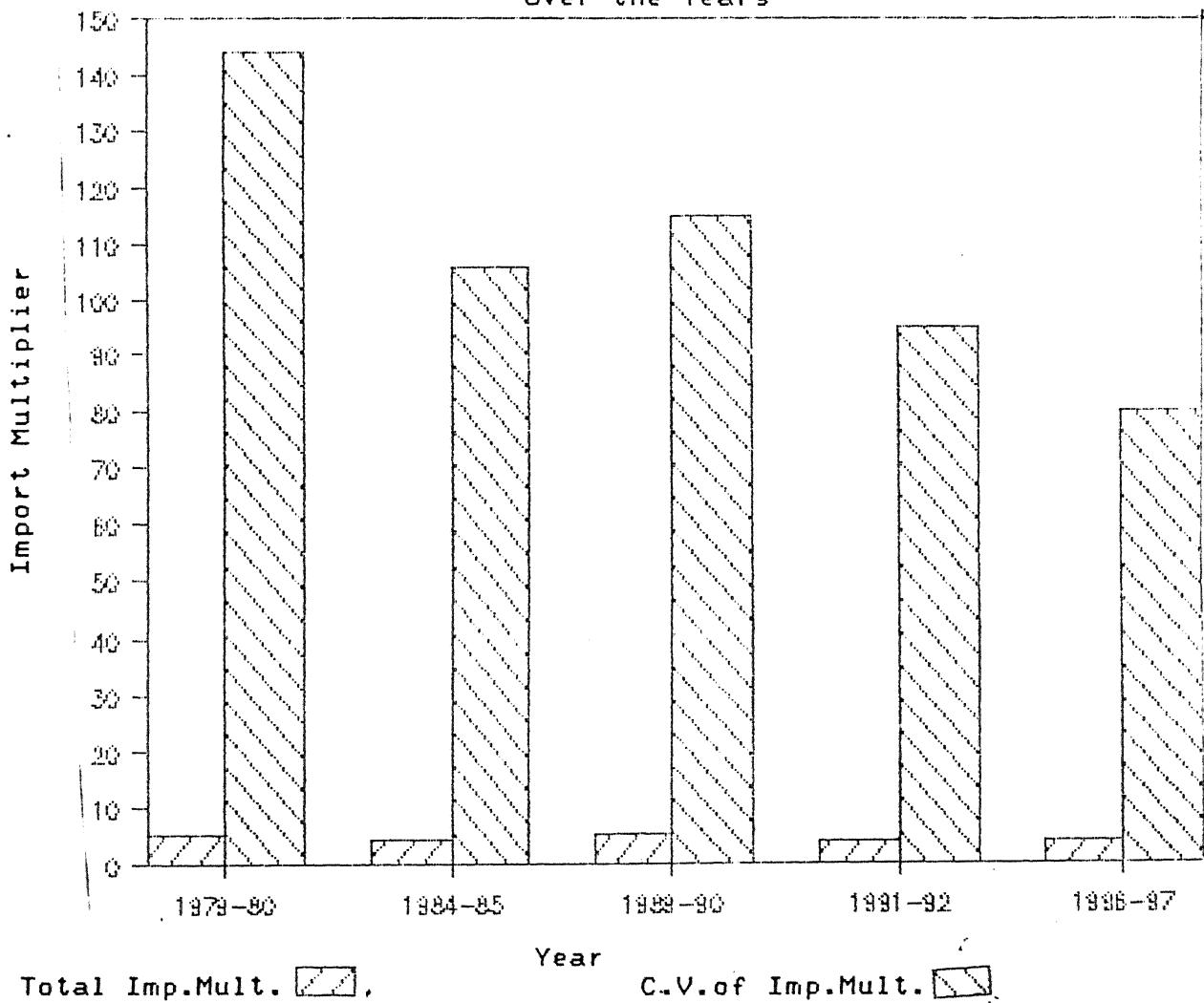
Table 5.8 : Import Multiplier of Various Sectors and Exports Over the Years

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	0.034528	0.045446	0.040772	0.040868	0.040488
2	0.022417	0.039753	0.054389	0.042346	0.045462
3	0.090415	0.016174	0.010118	0.012039	0.016658
4	0.010256	0.026830	0.022068	0.015953	0.017159
5	0.011183	0.018372	0.015413	0.012251	0.013787
6	0.011720	0.008082	0.008259	0.006223	0.006115
7	0.015638	0.010788	0.009867	0.011971	0.027543
8	0.010909	0.013131	0.061576	0.023186	0.029527
9	0.025864	0.008743	0.028144	0.011148	0.014365
10	0.155751	0.045458	0.065767	0.029793	0.028647
11	0.100973	0.020098	0.032092	0.015317	0.027401
12	0.043159	0.035093	0.035253	0.022187	0.031628
13	0.023164	0.038974	0.057874	0.026716	0.039574
14	0.051843	0.030891	0.035693	0.037339	0.052657
15	0.046834	0.035787	0.059641	0.038072	0.042903
16	0.031745	0.049051	0.038811	0.026258	0.042389
17	0.048844	0.029791	0.033129	0.022880	0.020181
18	0.039922	0.023010	0.027222	0.024714	0.028738
19	0.073049	0.030845	0.015967	0.009280	0.009503
20	0.072807	0.078212	0.062447	0.044386	0.060981
21	0.037705	0.029557	0.052806	0.041864	0.045256
22	0.072025	0.045371	0.063075	0.045031	0.038167
23	0.056633	0.071749	0.063351	0.049114	0.035389
24	0.875055	0.478676	0.600222	0.305687	0.206207
25	0.059684	0.041554	0.080201	0.039538	0.037024
26	0.090877	0.214689	0.150290	0.142656	0.118448
27	0.111663	0.054524	0.066679	0.065923	0.092672
28	0.081533	0.094425	0.074321	0.073491	0.039429
29	0.110925	0.090051	0.111756	0.097153	0.096605
30	0.113758	0.128467	0.025972	0.020664	0.104509
31	0.100255	0.144778	0.197322	0.159497	0.143673
32	0.155715	0.098350	0.186893	0.089994	0.124234
33	0.157839	0.112721	0.317957	0.143091	0.140218
34	0.133220	0.132003	0.199164	0.123612	0.107082
35	0.106593	0.100719	0.148356	0.103225	0.086498
36	0.092798	0.112904	0.043499	0.009372	0.011261
37	0.094732	0.095325	0.168633	0.080131	0.100045
38	0.101973	0.109035	0.164220	0.072955	0.184488
39	0.067196	0.062049	0.050787	0.077178	0.050821
40	0.046280	0.080234	0.107525	0.064587	0.173158
41	0.078682	0.074130	0.086824	0.068693	0.071810
42	0.167940	0.158801	0.119447	0.122190	0.100850
43	0.061593	0.047677	0.054305	0.034925	0.039458
44	0.064377	0.067536	0.108878	0.116719	0.121491
45	0.008558	0.014047	0.012175	0.016884	0.015975
46	0.022704	0.023227	0.017502	0.017367	0.015887
Exports	1.052684	1.057458	1.071410	1.051083	1.067935
Total	5.044039	4.344606	5.058096	3.705574	3.964320
Avg.	0.086768	0.071459	0.086667	0.057706	0.062964
S.D.	0.125100	0.075696	0.099488	0.054946	0.050263
C.V.	144.1776	105.9292	114.7934	95.21789	79.82839

200

Fig 5.4 Total Import Multipliers

Over the Years



Total Imp.Mult.

C.V.of Imp.Mult.

mining sectors, agro-based products, chemical and metal based manufacturing sectors. The import intensity of export goods also increased during this period. During the mild liberalisation phase , we observe that the import intensity increased in fewer sectors i.e. in 16 sectors and came down in 30. It came down in mostly agricultural, mining, agro-based, chemical based manufacturing sectors. It has also come down in transport equipment, services and other manufacturing sectors. However after the major liberalisation of trade during 1991, we find that, the import-intensity is increasing in comparatively more sectors. We also observe that before the liberalisation the coefficient of variation (C.V.) of the import-intensity of various sectors was more, which decreased during 1984-85. However although it again increased after mild liberalisation in 1984-85 ,in the later period , i.e. after the major liberalisation it has been decreasing at much faster rate. It shows that not only ,the import intensity of the overall economy has decreased, the variation among various sectors with respect to import-intensity in the economy is also coming down. It indicates that the wide variation in import intensity among sectors is also decreasing with trade liberalisation.

The import intensity of exports is also increasing after the trade liberalisation and it has reached the level higher than that obtained before the liberalisation of trade during 1984-85. Thus we find from the above analysis that at the sectoral level more sectors are becoming dependent on complementary imports and the export goods are also becoming more import intensive with the trade liberalisation. However at

the overall economy level, the import dependence in the later period is comparatively less than during the pre-liberalisation period. Therefore the trade liberalisation may not adversely affect the economy with regard to import requirement.

When we estimate the impact of competitive imports on the import intensity in the various sectors , by subtracting the competitive imports from the technology coefficient matrix ,we observe from the appendix Table 5A.10 that the import intensity increases in absence of competitive imports for most of the sectors during the pre-liberalisation phase. After the trade liberalisation however, we find that the import intensity increases in comparatively less number of sectors compared to the earlier period. However in the absence of the competitive imports in intermediate inputs, the import-intensity of exports increases in all the periods. We also observe that the import intensity (backward linkages to the complementary imports) of the various sectors decrease in 12, 25 and 16 sectors during the pre-liberalisation, mild liberalisation and the post liberalisation periods respectively.

5.6.2 Export capability

The potential of the economy to provide output for exports is termed as export capability. In this section we shall discuss the position with regard to the export potential of various sectors and the economy as a whole during various phases of trade liberalisation. It has been done with the help of the forward export multipliers of various sectors and the complementary imports during the above

mentioned periods. On the corresponding analogy as in case of compound import intensity, the export multiplier of any sector or imports can be defined as the 'value of exportable good or service provided by the unit value worth growth in output of the concerned sector or import'. The estimates of compound export multipliers (direct, indirect and induced forward export multiplier) for various sectors and complementary imports are presented in Table 5.9.

From the Table 5.9 we observe that the overall export capability of the economy has been increasing allthrough during the period of eighties and early nineties irrespective of the Government's trade policy. However we observe that compared to the pre-liberalisation phase when it increased albeit a little, after 1984-85 it increased much faster and after 1991-92, the major trade liberalisation period, the same has increased at very fast pace. While the total export multiplier of the economy was 6.08 units worth value of exports for the output of 46 units during 1979-80 . The same during 1984-85 and 1989-90 rose to 6.59 and 7.29 respectively with a growth of about 1.2 units during a span of ten years. However it increased from 7.29 in 1989-90 to 8.45 during 1991-92 and then it is likely to increase to 10.72 during 1996-97 ,i.e. a rise of more than 3.4 units during a span of 7 years only. We can also have the similar view from Fig. 5.5. Thus we find that the overall export potential of the economy is likely to grow at much faster rate after the liberalisation of trade.

**Table 5.9: Export Multipliers of the Various Sectors
and Complementary Imports over the Years**

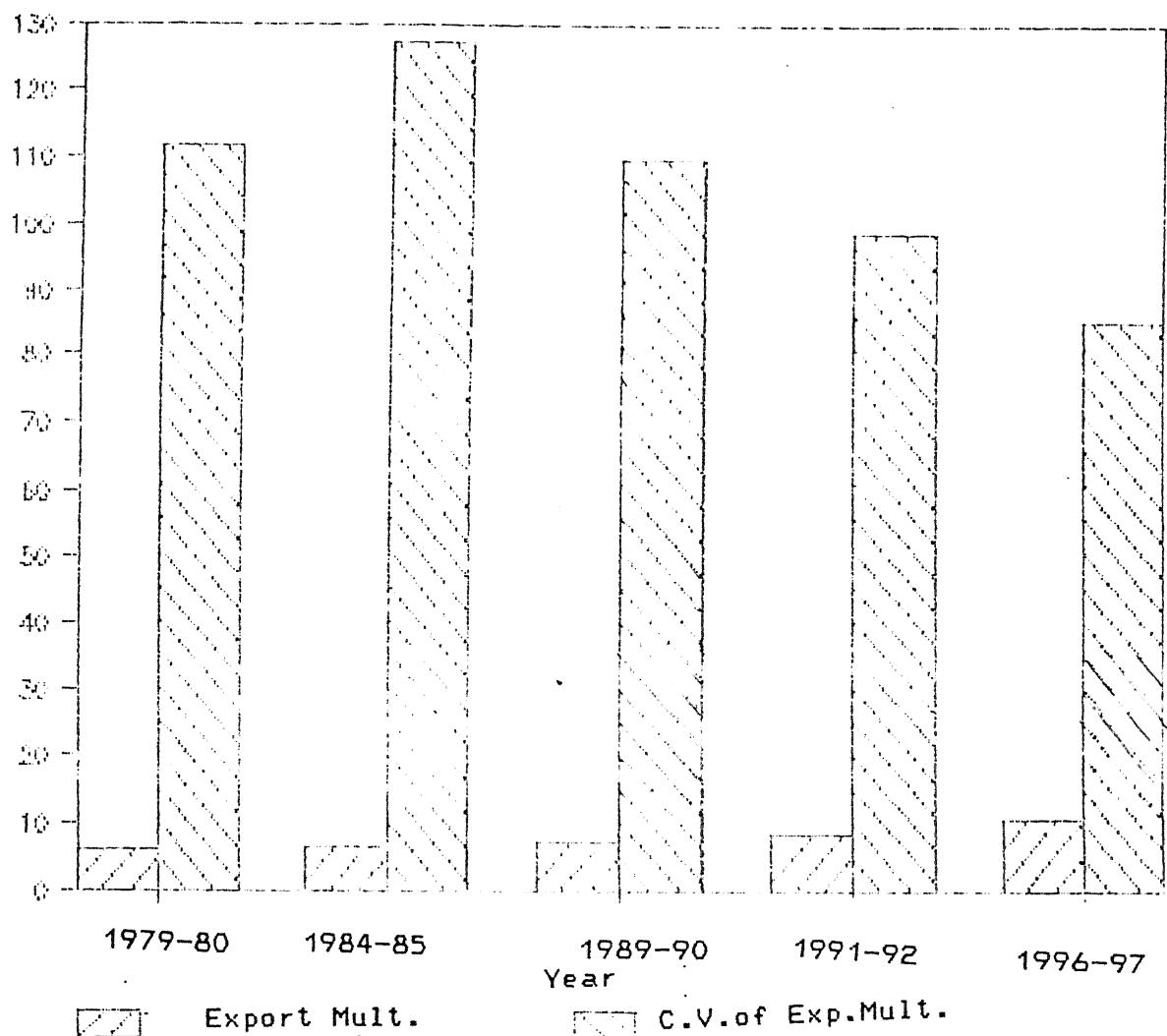
Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	0.019768	0.021742	0.012339	0.012078	0.016443
2	0.183811	0.099498	0.165193	0.373655	0.474114
3	0.145466	0.164965	0.181321	0.322058	0.189341
4	0.051413	0.080982	0.048608	0.069192	0.091971
5	0.023985	0.040546	0.024065	0.025539	0.029228
6	0.086646	0.158381	0.030453	0.035084	0.077335
7	0.026178	0.076472	0.185494	0.273447	0.300646
8	0.079156	0.066646	0.116766	0.085860	0.114894
9	0.090486	0.751409	0.106950	0.132512	0.191816
10	0.720082	0.536879	0.679411	0.652285	0.752969
11	0.182414	0.185562	0.206973	0.281415	0.418460
12	0.046507	0.024819	0.009182	0.008739	0.017086
13	0.000958	0.000914	0.039698	0.036841	0.034914
14	0.158541	0.156101	0.052800	0.051035	0.053485
15	0.076183	0.061211	0.103927	0.153373	0.239473
16	0.120705	0.022122	0.051491	0.091535	0.135540
17	0.104052	0.106239	0.078265	0.094201	0.125785
18	0.346006	0.112456	0.441341	0.486485	0.671447
19	0.038890	0.207936	0.054850	0.068028	0.094010
20	0.064917	0.044406	0.077108	0.085090	0.131519
21	0.419684	0.391529	0.604152	0.769577	0.691415
22	0.058174	0.079196	0.193675	0.255448	0.256323
23	0.158544	0.044254	0.158036	0.202923	0.250164
24	0.063871	0.091527	0.110640	0.135196	0.199188
25	0.094763	0.047552	0.056583	0.067969	0.105922
26	0.059393	0.028383	0.040675	0.049969	0.066175
27	0.110458	0.094030	0.135597	0.181995	0.267325
28	0.100219	0.036632	0.073105	0.289311	0.351278
29	0.117801	0.236145	0.132149	0.222213	0.298147
30	0.030323	0.030851	0.087898	0.019048	0.034602
31	0.035849	0.046342	0.582826	0.091483	0.086940
32	0.074280	0.091667	0.067682	0.097397	0.125600
33	0.126248	0.059530	0.128361	0.163887	0.248221
34	0.071808	0.100177	0.112251	0.109752	0.176157
35	0.060472	0.049027	0.058443	0.073093	0.091024
36	0.064403	0.054784	0.079766	0.086617	0.197411
37	0.063089	0.121639	0.075439	0.099851	0.115015
38	0.070028	0.045248	0.093011	0.118665	0.170973
39	0.065278	0.024864	0.098951	0.106269	0.423788
40	0.302591	0.604204	0.093798	0.389673	0.556684
41	0.076477	0.094813	0.124360	0.107358	0.208572
42	0.061982	0.046613	0.134110	0.129752	0.152593
43	0.066618	0.080692	0.072744	0.085036	0.114232
44	0.021264	0.012788	0.014887	0.011793	0.014789
45	0.027008	0.029918	0.082224	0.085678	0.115611
46	0.058025	0.064102	0.084254	0.100374	0.129864
Compl. Im.	1.056059	1.065518	1.069203	1.062744	1.110733
Total	6.080897	6.591334	7.231073	8.451545	10.71924

Compl. Im. = Complementary imports

Avg.	0.109235	0.120126	0.133953	0.160626	0.208880
S.D.	0.122067	0.153069	0.146913	0.158911	0.179161
C.V.	111.7471	127.4236	109.6750	98.93264	85.77229

Fig 5.5 Total Export Multipliers**Over the Years**

Export Multiplier



When we analyse the results for the various sectors over the years, we observe that during the pre-liberalisation phase i.e. during the period 1979-80 to 1984-85, the compound export capability of 24 sectors increased while for 22 sectors it came down. It increased for all the agricultural sectors except fibre crops, crude petroleum and iron ore minerals, chemicals, cement, non-metallic mineral products, iron and steel, non-electric machinery, motor vehicles, other manufacturing, electricity communication and other service sectors. At the same time it came down for most of the agro-based industries, fertilisers, pesticides, paper, leather, plastic products and other transport, construction service sectors. After 1984-85 ,i.e. during the mild liberalisation phase, the export capability of 32 sectors increased while only for 12 sectors it came down. The sectors for which the export capability increased were fibre crops, tea & coffee, fishing, all mining sectors except crude petroleum ,all agro-based industries except sugar, other food products, woollen textiles and wood products, all drugs, pharmaceuticals, fertilisers, pesticides, synthetic fibre and resin, paper, rubber, plastic and petroleum products, metals and machinery and transport equipments except motor vehicles and services except construction.

The export capability of complementary imports has regularly increased throughout the period of eighties and early nineties. It shows that the complementary imports are becoming more useful for producing exportable products over the years. Further we observe that the export capability is likely to go up at much faster pace after the major trade

liberalisation i.e., after 1991-92. After 1991-92 we observe that except for the three sectors viz., tea & coffee ,leather products and other non-metallic mineral products, for all the sectors in the economy the export capability is likely to go up after 1991-92. Thus we observe that after the trade liberalisation the production of exportable goods is likely to increase at very fast rate.

We have also estimated the potential export capability of the various sectors in the absence of the competitive imports in intermediate use. We can observe from the appendix Table 5A.11 that during the pre-liberalisation phase, the export-linkages of the variou sectors decreased in 18 sectors,,while such sectors would be only 8 after the trade liberalisation. As such the export-linkages of most of the sectors would increase in absence of competitive imports. Such adverse effect of competitive imports on export-capability of domestic economy would be less during the period after the trade liberalisation. Further we observe from this table that the export capability of complementray imports also increases in such case for all the periods. So the complementary imports also become more effective for export-promotion in absence of competitive imports. Thus we can state that the competitive imports could be substituted without adversely the exports in a significant way in most of the sectors.

Therefore we find that the trade is likely to help in a very positive way in terms of reduction of trade-gap by way of reduction in import intensity as well as by increase in export capability. Though it may take some years before which the trade-

gap may be bridged.

5.6.3 Output Multipliers

The growth of domestic production is the main objective of any economic policy. It is the main vehicle for providing employment, income and consumable goods as well as capital goods for investment in the economy. For understanding the prospects of growth of output in the economy, the backward and forward output multipliers of various sectors are very useful.

5.6.3.1 Backward Output Multipliers

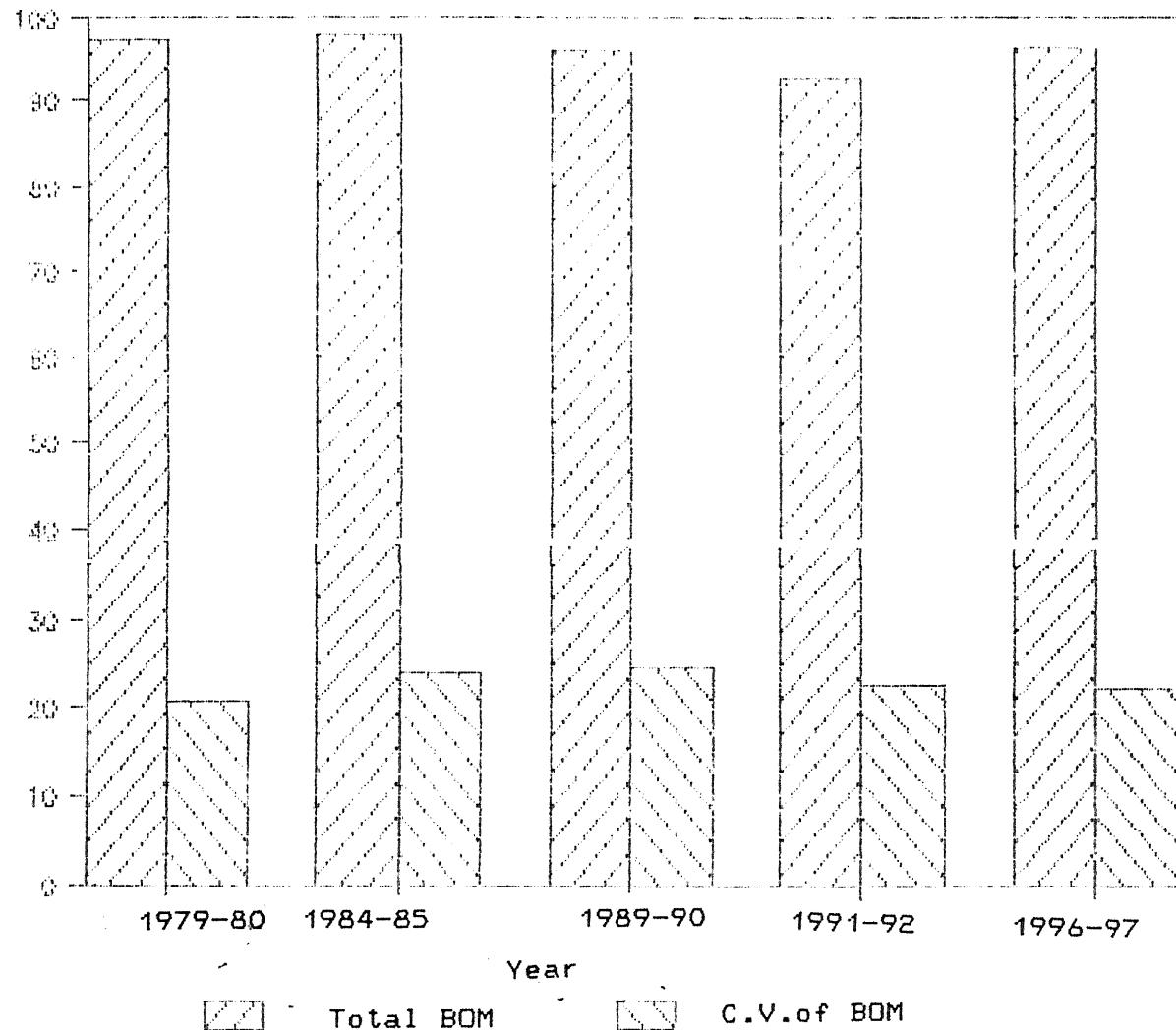
Let us first discuss the Backward Output Multipliers (BOM) , which describe the stimulus to production in the upline production stream in the economy . Table 5.10 presents the BOM for various sectors and the exports in the semi-closed I-O framework for the different periods under consideration.

From this table we observe that for the economy as a whole the BOM increased during the pre-liberalisation phase but the same has decreased after the mild level of liberalisation i.e. during the period 1984-85 to 1991-92 . However it is evident from this table that after 1991-92, there is a significant increase in it. We can also have clear view of the same from Fig. 5.6. Nevertheless we also observe that the C.V. of BOM of various sectors during the pre-liberalisation and the early mild liberalisation periods increased but after 1991-92 the same has come down. It shows that during the restricted trade period, the BOMs were unevenly spread over the sectors

**Table 5.10 : Backward Output Multipliers of Various Sectors
and Exports over the Years**

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	1.478583	1.512500	1.788875	1.854359	1.999697
2	1.277584	1.501439	1.863575	1.708737	1.848401
3	2.366860	1.555547	1.246686	1.294562	1.408590
4	1.148020	1.265294	1.382405	1.305059	1.338947
5	1.753624	1.843564	1.856945	1.801356	1.890567
6	1.254376	1.192425	1.120100	1.125346	1.140696
7	1.263502	1.158645	1.112421	1.236173	1.404919
8	1.466080	1.377338	1.920154	1.523743	1.679928
9	1.455306	1.144528	1.350974	1.205919	1.324560
10	2.214871	1.356546	1.595032	1.456374	1.589781
11	1.668895	1.237208	1.343818	1.266657	1.523591
12	2.363093	2.175960	2.328578	2.126227	2.207553
13	2.349669	2.092931	2.242010	1.940413	2.057009
14	2.570549	2.267390	2.352736	2.516043	2.695186
15	2.279933	2.112594	2.676399	2.426438	2.567522
16	1.907853	2.397978	2.366413	2.146510	2.099572
17	2.593788	2.603006	2.310048	2.185013	2.089654
18	2.171121	1.967878	1.999326	2.181200	2.244545
19	1.964987	2.466988	2.009826	1.794839	1.850021
20	2.272030	2.629202	2.585193	2.244334	2.303377
21	2.541882	2.319903	2.792035	2.510732	2.643108
22	2.605336	2.395147	2.175305	1.916091	1.649526
23	2.166073	2.259074	2.294414	2.394933	2.061013
24	2.687467	2.276567	2.643139	2.393655	2.704130
25	2.352654	2.472825	3.058824	2.396842	2.407291
26	2.267094	2.689254	2.192194	2.215876	2.247521
27	2.537934	2.675102	2.068670	2.168546	2.233507
28	2.430460	2.484828	2.250245	2.700712	1.895276
29	2.189628	2.589490	2.203903	2.133985	2.109713
30	2.356396	2.391457	1.679106	1.789511	1.820825
31	2.234676	2.478621	2.357564	2.060882	2.100183
32	2.426916	2.600695	2.701033	2.625797	2.893857
33	2.176709	2.574579	3.332313	2.545309	2.759482
34	2.162350	2.479368	2.353727	2.374396	2.669473
35	2.285181	2.454754	2.008444	2.133859	2.208025
36	2.655582	2.633097	1.489077	1.227568	1.256073
37	2.337100	2.630392	2.405160	2.282041	2.508071
38	2.129121	2.622763	2.008496	2.356161	2.368878
39	2.123977	2.362532	1.752791	1.951876	2.411972
40	1.800661	2.181068	1.771260	1.747428	1.803078
41	1.874356	2.049747	2.211897	2.523190	2.611346
42	2.046555	1.708482	1.865455	2.073443	2.214303
43	1.991816	1.847056	2.258295	2.055168	2.090486
44	2.345235	2.244160	2.254813	2.349623	2.452693
45	1.154955	1.240840	1.301208	1.443604	1.630329
46	1.604383	1.564759	1.327559	1.326748	1.355886
Exports	1.990619	1.919356	1.896321	1.847984	1.937971
Total	97.29586	98.00490	96.10478	92.88528	96.30815
Avg.	2.071853	2.088816	2.048010	1.979071	2.051525
S.D.	0.428085	0.501233	0.501168	0.443670	0.451579
C.V.	20.66196	23.99607	24.47100	22.41812	22.01186

**Fig 5.6 Backward Output Multipliers
Over the Years**



while later the same have been comparatively evenly distributed among the various sectors. Further as we see that the BOM of exports decreased during the whole period of pre-liberalisation as well as the mild liberalisation period, but after 1991-92, there is marked growth in the same. It shows that the backward stimulus due to exports as well as due to the production in the various sectors is likely to increase at significant rate after the liberalisation of trade. We also feel that the limited level of liberalisation of trade is not very significantly useful for growth of output in the economy and particularly for growth of exports and for deriving output linkages from the same. The controls on imports inhibit backward output linkages from the exports to the domestic economy.

With regard to the BOM of various sectors, we observe that during the period of controls on imports, the BOM increased for 26 sectors, mostly among the agricultural sectors, non-agro-based manufacturing industries,machinery and transport equipments. The BOM of agro-based, tea & coffee, forestry and fishing,service sectors decreased although at the overall level BOM increased. After 1984-85 however, the BOM of 20 sectors increased, these sectors comprised of mostly agricultural sectors, mining, cotton textiles, ,textile products, leather, plastic and petroleum products, iron & steel and service sectors. So we see that after the mild liberalisation the BOM came down at the overall economy level as well as for majority of sectors and the trend was quite distinguished among the category of sectors. After 1991-92 however, we find that BOMs are likely to go up in 40 sectors, and only 6 sectors,viz.

Silk and synthetic textiles, woollen textile products, rubber and plastic products, synthetic fibre and resin and other chemicals sectors show decline in BOM during this period. Thus we observe that after 1991-92, i.e. with major liberalisation of trade the backward output multipliers are likely to increase in most of the sectors significantly and particularly in agriculture, mining, manufacturing and service sectors.

From the above analysis we observe that the stimulus for domestic production in upline stream is likely to grow faster with the trade liberalisation and the exports are also likely to contribute in it significantly. It may also be noted here that the limited extent of liberalisation is not likely to be of use, it may rather inhibit growth and also for usefulness of exports.

We have also analysed the coefficient of dispersion of the BOLs during the different periods over the various sectors. It helps us to study the concentration of output linkages in a few sectors or spread in many sectors. We have presented these estimates for various periods in appendix Table 5A.12. From this table we observe that the Coefficient of Dispersion of BOL of Exports decreased during the pre-liberalisation phase. After 1984-85 it is increasing but after 1991-92 it is again going down. It indicates that during the pre-liberalisation phase the exports were tending to provide the BOLs spread over more sectors, which tendency began to decrease after 1984-85. After 1991-92 however the spread-over effect of BOL of exports is likely to increase again. We observe that in 16 sectors the C.D. of BOL has been decreasing regularly over the years. Besides there are 15 sectors for which the C.D. of BOLs is

following the trend of BOL of exports. This is the trend in most of the primary nad agro-based sectors. For these sectors, the concentration of output linkages in a few sectors is coming down wxcwpt during the period of mild trade liberalisation. However there are 11 sectors , which are showing reverse trend in C.D. of BOL. These are mostly sectors in processing sectors, machinery and equipments. Thus we find that overall the growth of output is likely to be more wide-spread in the economy after the trade liberalisation except in some processing and machinery sectors.

Besides the impact of complementary imports, it is of use to study the impact of competitive imports on the output linkages. For this we analyse the backward output linkages of the various sectors and exports in absence of the competitive imports. When we compare the BOLs with and without competitive imports from appendix Table 5A.13, we observe that the BOLs are more in most of the sectors in absence of competitive imports. There are only 7 to 9 sectors during various periods which have less BOL in absence of competitive imports. Thus we can say that the BOLs can be increased in the domestic economy by substituting the competitive imports. It may however be stated here that the Backward Output Multipliers would be less in absence of the competitive imports. So the competitive imports can only be substituted by domestic production and they can not be eliminated altogether. Further, we observe from the Table 5A.12 that the BOLs of exports also increase in this case. So it is prudent to substitute the competitive imports for the growth of domestic production.

5.6.3.2 Forward Output Multipliers

The stimulus to production in the downline stream is estimated by the Forward Output Multipliers (FOMs) for the various sectors , for complementary imports and the economy as a whole. The estimates of FOM for the above concerned period are given in Table 5.11. From this table we observe that the FOMs increased for the economy during the pre-liberalisation period very significantly, but the C.V. of FOM for various sectors was very high and it further increased during this period. But after 1984-85, we find that the FOM for the economy as a whole decreased almost to the level as in 1979-80 however the C.V. also came down. The Fig. 5.7 also presents graphically the same picture. It shows that the stimulus for downline production decreased after mild liberalisation. But while most of the stimulus was derived from a few sectors, it became more wide-spread after 1984-85. After 1991-92 however, we observe that the FOM has increased very rapidly and the C.V. has also decreased very significantly showing that the downline production is likely to go up at very fast rate after 1991-92.

When we analyse the results for various sectors we find that during the pre-liberalisation phase 24 sectors gain in terms of FOM, mostly from the primary sectors except foodgrains and fibre crops, chemicals, metals and machinery based sectors. After 1984-85 however, the FOM decreased in 28 sectors and most of the sectors in primary, metal based secondary and service sectors suffer on that account during this period. But after 1991-92 ,we observe that FOM are likely to increase for 35

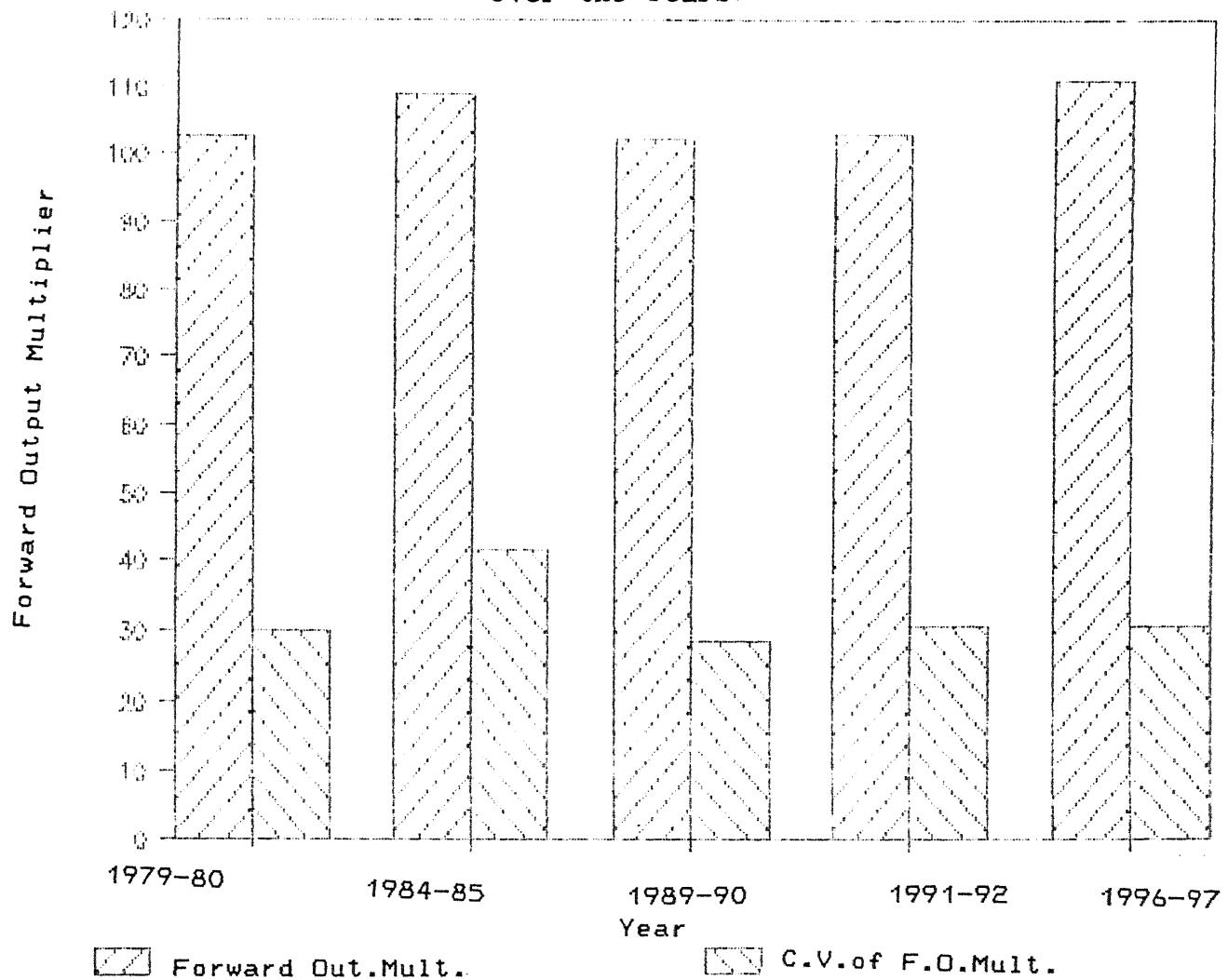
**Table 5.11: Forward Output Multipliers of Various Sectors
and Complementary Imports over the Years**

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	1.244778	1.219994	1.283438	1.209986	1.215196
2	2.733013	2.619604	2.705597	2.769559	2.868526
3	2.654110	2.937849	2.287713	2.272474	2.250821
4	1.693022	2.251354	1.821479	1.761287	1.660808
5	1.281226	1.821889	1.516716	1.399964	1.410147
6	2.008199	2.465955	1.914599	1.918705	2.380988
7	1.279909	1.785691	1.445023	1.467329	1.464126
8	3.532291	3.539879	3.740906	3.232281	3.322965
9	2.904072	3.907386	3.606264	3.576432	4.024918
10	2.863805	2.992581	2.877771	2.834456	2.895387
11	3.151997	3.956085	2.985557	3.353059	3.451847
12	1.291347	1.178265	1.117918	1.113216	1.229354
13	1.049787	1.034353	2.016746	1.951072	1.801118
14	1.537660	1.675949	1.262904	1.314134	1.255828
15	1.474478	1.354013	1.611017	1.699340	1.816123
16	1.532627	1.126167	1.559604	1.521626	1.559960
17	1.614733	2.070462	1.579493	1.652112	1.661492
18	2.292988	1.746224	2.051582	2.057887	2.119195
19	2.166113	6.129697	2.334033	2.401766	2.511229
20	2.705158	2.164443	2.832214	2.470687	2.697010
21	1.953612	1.766363	2.096103	2.094479	2.140419
22	2.239327	2.129982	2.038261	2.076246	2.211123
23	3.143745	1.273013	2.142171	2.431836	2.678768
24	2.767577	2.794755	2.647023	2.574839	3.092659
25	3.224274	2.662389	3.054190	3.062180	3.496603
26	2.828574	2.134130	2.659769	2.523244	2.519422
27	3.201985	3.041415	3.091830	2.851644	3.018728
28	2.726599	1.967197	2.136512	4.274887	4.080194
29	2.987069	4.074975	2.520863	2.645379	2.484494
30	2.792677	3.608693	2.472766	2.287151	2.361853
31	2.149733	2.367343	2.251037	2.096752	2.172045
32	2.622827	2.885170	2.667646	2.798721	3.229094
33	2.531237	2.238518	3.244605	3.184546	3.823033
34	1.560226	1.927080	1.741167	1.644525	2.438370
35	1.407001	1.510119	1.775564	1.739560	2.225350
36	1.701147	1.887327	2.454358	2.580371	2.641795
37	1.628326	2.036041	1.663246	1.744658	2.057830
38	1.797187	1.679185	1.573318	1.523647	2.016983
39	1.630849	1.451722	1.497960	1.495486	3.115803
40	2.105607	3.468644	2.302898	2.450831	2.259834
41	2.122876	2.158954	2.204510	2.219586	1.992050
42	2.205420	1.722691	2.176489	1.975789	2.169364
43	3.122502	3.227573	2.958692	2.897673	2.788124
44	1.552289	1.371155	1.334132	1.226791	1.217424
45	1.883806	1.915623	2.066882	2.002402	2.159123
46	1.946170	1.930526	1.675369	1.681668	1.723447
Compl.Im.	1.886330	1.767783	1.459104	1.126958	1.139219
Total	102.7303	108.9762	102.4570	103.1892	110.8502

Compl.Im. = Complementary imports

Avg.	2.192260	2.330618	2.195607	2.218745	2.385021
S.D.	0.659067	0.972959	0.628764	0.685750	0.733043
C.V.	30.06336	41.74683	28.63736	30.90710	30.73528

**Fig 5.7 Forward Output Multipliers
Over the Years.**



sectors, while only for tea & coffee, other crops, fishing, gur & khandsari, other food products, fertilisers, other chemicals, other manufacturing sectors and rail transport, electricity and other service sectors are likely to decrease during this period.

We also observe from this table that the FOM of complementary imports decreased significantly during the pre-liberalisation phase as well as after the mild liberalisation. However it is likely to marginally increase after the major liberalisation. It indicates that gradually the essential imports are not being effectively utilised for production in the domestic economy. Their use is becoming gradually less efficient particularly after the removal of many restrictions on imports. This cautions us for being selective and careful in using essential imports in production.

Besides the average FOL, it is important to analyse the C.D. of FOLs to study the distribution of the FOLs due to a sector among the various sectors over the years. From appendix Table 5A.14 we observe that the C.D. of FOL increased in 30 sectors during 1979-80 to 1984-85 and decreased in the remaining sectors, while during the mild trade liberalisation period, the same increased in 25 sectors and came down in 21 sectors. After 1991-92 however we observe that the same increased in 15 sectors. Thus we find that the FOLs would be more widely distributed after the trade liberalisation than prior to it. However we observe that in some sectors the trend was reverse during the mild liberalisation phase. For FOL of complementary imports also we

have found that the C.D. of FOL decreased prior to liberalisation of trade as well as during the post 1991 period. In the mild liberalisation phase the FOL due to imports were distributed in a few sectors. Thus we find that the trade liberalisation is better for more wide-spread distribution of output linkages in the domestic economy.

Further we have also estimated the impact of competitive imports on the FOLs of various sectors. We can observe from the appendix Table 5A.15 that the FOLs increase in most of the sectors in absence of competitive imports. we observe from this table that while during the pre-liberalisation period 10 sectors were adversely affected in terms of FOLs in absence of competitive imports, after the trade liberalisation such sectors are only 5 to 8. As such 36, 41 and 38 sectors are providing higher FOLs in absence of competitive imports during the pre-liberalisation, mild liberalisation and the post major liberalisation periods respectively. Further we observe that the FOL due to complementary imports in absence of competitive imports also increase during the post liberalisation period. The same during the pre-liberalisation phase was decreasing. Thus we can infer that it would be more appropriate to substitute the competitive imports for providing increased FOLs to most of the sectors. However it may be stated here that the output multipliers are expected to come down in absence of competitive imports.

From the above analysis we find that the trade liberalisation is likely to help in growth of production by way of stimulus both in upline and downline production, but we have

to be cautious about adequately efficient use of valuable essential imports. Exports are also likely to be much more effective in inducing growth of production in future with trade liberalisation.

5.6.4 Income Intensity

Trade liberalisation may have significant bearing on income generation in the domestic economy. Since the growth in imports may cause some loss in production in the sectors which are competing with imports, it may lead to loss of income in those sectors. On the other hand with the availability of additional inputs and raw materials, the additional production activity may result in additional income in some sectors. It is therefore important to study the impact of liberalisation of trade on income generation in various sectors and in the economy as a whole. Let us now examine the income intensity in the following paragraphs.

Before analysing the compound income linkages and multipliers, let us first discuss the comparative position of gross value added out of gross output during the different periods as given in Table 5.12. From this table we observe that during the pre-liberalisation phase, the direct income intensity of 23 sectors increased comparatively. After 1984-85, however the same grew in 32 sectors. But after 1991-92, it increased marginally in 5 sectors. We observe that during the pre-liberalisation phase, the income intensity was high in agriculture and agro-based industries, service sectors. After liberalisation, the direct income intensity increased in export-

Table 5.12 : Proportion of Gross Value Added Over the Years

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	0.7374	0.7216	0.6662	0.6397	0.5999
2	0.8566	0.7646	0.5661	0.6264	0.5940
3	0.3081	0.7463	0.8707	0.7827	0.7407
4	0.9141	0.8932	0.7358	0.7574	0.7430
5	0.4394	0.4188	0.4824	0.4278	0.3929
6	0.8678	0.8999	0.9187	0.9251	0.9207
7	0.8437	0.9243	0.9395	0.8447	0.7674
8	0.7175	0.7969	0.5149	0.7273	0.7194
9	0.7414	0.9091	0.8202	0.8378	0.7913
10	0.3475	0.8112	0.6802	0.8465	0.8184
11	0.6396	0.8778	0.7862	0.8306	0.7897
12	0.1360	0.1734	0.1621	0.1868	0.1572
13	0.1458	0.2520	0.2727	0.2631	0.2335
14	0.1317	0.1596	0.1558	0.1749	0.1634
15	0.2462	0.3459	0.2705	0.3865	0.3720
16	0.4297	0.0984	0.1654	0.2560	0.2251
17	0.1128	0.1160	0.2706	0.2736	0.2215
18	0.3257	0.4663	0.4529	0.5753	0.5490
19	0.4331	0.2407	0.2239	0.3994	0.3946
20	0.3036	0.1417	0.2626	0.3453	0.3379
21	0.2175	0.2862	0.2592	0.3052	0.3056
22	0.1740	0.1904	0.2494	0.3021	0.3041
23	0.3002	0.1417	0.2520	0.2928	0.2369
24	0.1516	0.1571	0.0396	0.0532	0.0481
25	0.1281	0.1455	0.0438	0.0782	0.0636
26	0.3167	0.1774	0.1636	0.2296	0.2218
27	0.1923	0.1479	0.2571	0.3154	0.2796
28	0.2364	0.1774	0.2248	0.2574	0.2335
29	0.3293	0.1583	0.2385	0.3147	0.3185
30	0.2376	0.2022	0.3776	0.3753	0.3838
31	0.3019	0.2519	0.3238	0.5134	0.5089
32	0.2176	0.1664	0.2520	0.2290	0.2256
33	0.3419	0.1166	0.1654	0.1600	0.1451
34	0.3627	0.2478	0.3025	0.2988	0.2751
35	0.2951	0.2268	0.3853	0.3320	0.2923
36	0.1835	0.2069	0.4351	0.4639	0.4604
37	0.2871	0.1516	0.2606	0.3111	0.3010
38	0.3983	0.1655	0.4949	0.4432	0.4154
39	0.3484	0.2717	0.4059	0.3711	0.2488
40	0.5500	0.4135	0.4190	0.5309	0.4987
41	0.5703	0.4729	0.4544	0.4171	0.4019
42	0.4331	0.5936	0.5428	0.4526	0.4354
43	0.4173	0.4817	0.3931	0.4500	0.4558
44	0.2905	0.3596	0.3827	0.3380	0.3310
45	0.9175	0.8769	0.8942	0.7957	0.7440
46	0.6627	0.6925	0.7859	0.7734	0.7558

oriented primary sectors, traditional agro-based and other secondary sectors, but it came down in service sectors. We observe that the ratio of gross value added to gross output came down in agricultural sectors and some of the service sectors, but for the secondary sectors, it increased after the trade-liberalisation. At overall level, there were more sectors with larger share (i.e. more than 50 %) of GVA out of gross output during the period after liberalisation than during the earlier period. It indicates that some additional sectors are becoming more income-intensive after the trade-liberalisation, although comparatively income-intensity has been going down in the economy as such.

5.6.4.1 Backward Income Linkages

To study the relative position of the various sectors with regard to income generation in the up-line production stream, we analyse the Backward Income Linkages (BILs) of various sectors over the concerned periods as presented in Table 5.13. From this table we observe that the direct, indirect and induced BILs increased significantly in 15 sectors, mainly agriculture, mining, agro-based manufacturing sectors during the pre-liberalisation phase. After the mild liberalisation i.e. from 1984-85 to 1991-92, the BILs increased in 20 sectors, comprising mainly of the machinery, transport ,other equipments, service sectors. But after 1991-92, the same are likely to increase in 26 sectors, which include all the primary sectors, food products, metals, machinery, equipment and service sectors. Thus we find that the trade-liberalisation is likely to make income-generation more broad-based with respect to BILs.

Table 5.13 : Backward Income Linkages of Various Sectors and Exports Over the Years

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	1.068425	1.072789	1.146400	1.132381	1.183346
2	1.082291	1.090085	0.940225	1.009400	1.057903
3	0.987701	1.112788	1.083620	0.991355	1.020938
4	1.094314	1.128685	1.006153	0.975349	1.003077
5	1.087180	1.077279	1.118206	1.005451	1.048366
6	1.088227	1.085357	1.070491	1.061649	1.095064
7	1.090713	1.085030	1.082131	1.029682	1.032368
8	1.082569	1.077201	1.006866	1.039341	1.108394
9	1.066092	1.078527	1.081257	1.008688	1.022868
10	0.946696	1.046653	1.013923	1.129203	1.190441
11	1.015260	1.074715	1.020643	1.023977	1.125499
12	1.036430	1.086525	1.078778	0.986193	1.005023
13	1.050717	1.069666	1.055360	0.891379	0.917681
14	1.001388	1.037437	1.005534	1.101075	1.153384
15	1.016416	1.044040	1.142334	1.176385	1.158096
16	0.846695	0.798068	0.746542	0.787747	0.711363
17	0.876166	0.950151	0.969890	0.888905	0.718385
18	1.008118	1.051172	0.996425	1.263227	1.206507
19	1.025757	1.026131	1.089187	1.084927	1.122758
20	0.994478	0.973477	1.038867	1.031475	1.060202
21	1.018226	1.003010	1.237130	1.126420	1.170668
22	0.917360	0.897485	0.846973	0.791598	0.645226
23	0.868148	0.724741	0.883562	0.955947	0.715618
24	1.016216	0.921939	0.955203	0.939938	1.132572
25	0.972811	1.008028	1.111429	0.895784	0.895115
26	0.984767	0.991731	0.720074	0.850080	0.885074
27	0.940685	0.995731	0.806565	0.948410	0.932884
28	0.971264	0.901570	0.806198	1.096160	0.676123
29	0.961964	0.957455	0.840374	0.915835	0.926503
30	0.988498	1.011049	0.796457	0.895158	0.895220
31	1.005117	1.028982	1.050849	1.127392	1.134545
32	0.947109	0.962381	1.106269	1.041071	1.087198
33	0.964857	0.929981	1.407919	0.983586	1.047591
34	0.947168	0.942491	1.015403	0.983089	1.036249
35	0.949067	0.935619	0.923956	0.902845	0.820466
36	0.960031	0.935632	0.709846	0.607309	0.626828
37	0.971593	0.835369	0.953258	0.931995	0.966568
38	0.983329	0.912541	1.066799	1.123677	1.133269
39	0.943161	0.948012	0.821019	0.858732	0.840937
40	1.034888	1.008690	0.847660	0.941779	0.949005
41	1.035602	1.015741	1.092808	1.211915	1.227683
42	0.980517	0.967304	1.006034	1.011877	1.028594
43	0.998186	1.034317	1.049724	1.048628	1.046377
44	1.024665	0.994336	1.065309	1.068361	1.065654
45	1.091677	1.078808	1.125917	1.073744	1.090669
46	1.059917	1.063684	1.046168	1.019023	1.045724
Exports	0.997518	1.027575	1.014244	1.031833	1.035954

22)

We also observe that the BILs due to exports increased during the whole period, although there was a marginal decline in it during the period 1984-85 to 1989-90 (period of mild liberalisation). The position with regard to temporal comparision of the effects of trade liberalisation on income generation in the economy can however be understood in a better way with the help of Backward Income Multipliers (BIMs) as given in the Table 5.14 . The Fig 5.8 also gives the temporal comparision of income multipliers of the overall economy.

From the Table 5.14 we observe that the overall Backward Income Multipliers (BIMs) gradually increased during the period 1979-80 to 1991-92. But after 1991-92, the BIMs are likely to go down very significantly (even below the level attained during 1979-80). We observe that during the period 1979-80 the BIMs of 22 sectors increased , most of such sectors were from the agriculture and agro-based industries besides chemicals and non-metallic mineral products, cement, electricity, and other service sectors. After 1984-85 the BIMs of 25 sectors increased, but the sectors providing increased BIMs were mostly among the textiles, machinery, transport equipments and service sectors rather than the agricultural sectors. But at the overall level ,the backward income multiplier increased. But after 1991-92, the BIMs of only 14 sectors increased while the same decreased for 32 sectors. The sectors which had increased BIMs were mostly from agriculture, minerals,machinery and transport equipment manufacturing sectors. The BIM of exports also followed the same trend, i.e. it increased upto the period 1991-92 and after the major liberalisation it is likely to go down. It may be observed from

Table 5.14 : Backward Income Multipliers of the Various Sectors and Exports Over the Years

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	0.965676	0.973196	1.047512	1.052504	1.064928
2	0.978251	0.988887	0.931637	0.938197	0.952038
3	0.892522	1.009482	0.990039	0.921426	0.918772
4	0.989144	1.023903	0.919303	0.906548	0.902698
5	0.982698	0.977270	1.021845	0.934527	0.943455
6	0.983673	0.984597	0.978028	0.986761	0.985480
7	0.985908	0.984301	0.988830	0.957049	0.929058
8	0.978502	0.977199	0.920062	0.966026	0.997476
9	0.953180	0.978402	0.987918	0.937535	0.920509
10	0.854921	0.949487	0.926505	1.049549	1.071313
11	0.917739	0.974944	0.932553	0.951746	1.012870
12	0.926710	0.985657	0.986055	0.916627	0.904450
13	0.949583	0.970363	0.964528	0.828502	0.825848
14	0.904440	0.941126	0.919007	1.023406	1.037964
15	0.918821	0.947116	1.070349	1.093404	1.042204
16	0.765764	0.723979	0.683898	0.732180	0.640176
17	0.792119	0.861943	0.887369	0.826202	0.646495
18	0.911017	0.953586	0.917208	1.174119	1.085771
19	0.926883	0.930869	0.995169	1.008397	1.010403
20	0.898461	0.883104	0.949509	0.958715	0.954107
21	0.920305	0.909895	1.130878	1.046963	1.053518
22	0.828898	0.814166	0.774377	0.735759	0.580658
23	0.781648	0.657459	0.807665	0.888515	0.644006
24	0.920144	0.836350	0.874210	0.873635	1.019235
25	0.847495	0.914447	1.015677	0.832596	0.805540
26	0.889122	0.899663	0.658509	0.790116	0.796504
27	0.850755	0.903292	0.737223	0.881510	0.839529
28	0.879842	0.817873	0.736907	1.018838	0.608463
29	0.873522	0.868569	0.768563	0.851233	0.833787
30	0.893379	0.917188	0.728248	0.832014	0.805634
31	0.908207	0.933456	0.960684	1.047867	1.021010
32	0.855894	0.873038	1.011202	0.967635	0.978401
33	0.874064	0.843646	1.287143	0.914205	0.942758
34	0.857203	0.854994	0.928216	0.913743	0.932551
35	0.856871	0.848760	0.844543	0.839159	0.738361
36	0.864238	0.848772	0.648643	0.564470	0.564101
37	0.878074	0.757817	0.871385	0.866253	0.869843
38	0.888899	0.827825	0.975088	1.044413	1.019862
39	0.852487	0.860003	0.750232	0.798158	0.756784
40	0.935251	0.915048	0.774757	0.875347	0.854037
41	0.935842	0.921444	0.998655	1.126427	1.104827
42	0.886430	0.877504	0.919448	0.940500	0.925662
43	0.901420	0.938296	0.959184	0.974658	0.941665
44	0.925921	0.902027	0.973631	0.993000	0.959013
45	0.986745	0.978657	1.028679	0.998003	0.981525
46	0.958078	0.964937	0.955851	0.947142	0.941078
Exports	0.901522	0.932179	0.929302	0.959048	0.932286
Total	42.44820	42.63673	43.06624	43.68464	42.29667

this table that after 1984-85 and upto 1989-90 (i.e. during the early phase of liberalisation) , the BIM of exports decreased albeit marginally. It is however interesting to note that the number of sectors providing high BIMs had increased from 2 to 8 during the pre-liberalisation phase, which further increased to 11 during 1991-92 and they are further likely to increase to 12 after 1991-92. Thus we see that the dispersion among various sectors in providing BIM is increasing over the years. The sectors having high BIMs are foodgrains, tea & coffee, other crops, metallic and non-metallic minerals, other food products, cotton textiles, textile , wood ,leather ,petroleum products and non-metallic minerals products, other transport equipments and railway transport service sectors. The latter four sectors have grown in importance with regard to BIM particularly after the trade liberalisation. But many sectors have lost in terms of BIM after the trade liberalisation e.g. some food products and chemical and textile based sectors. Thus we observe that there has been significant difference in backward income multipliers after the trade liberalisation. While some sectors have been positively affected , some of the others have been adversely affected. So there are definite policy implications of the trade liberalisation on income intensity in general and in case of certain sectors in particular.

5.6.4.2 Forward Income Linkages

For analysing the stimulus in income generation in the down-line production stream , we compare the direct, indirect, induced forward income linkages (FILs) of the various sectors over the different periods as presented in Table 5.15 . We

**Table 5.15 : Forward Income Linkages for Various Sectors
and Complementary Imports over the Years**

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	1.024783	0.966414	0.972498	0.830280	0.763507
2	1.621950	1.550989	1.209555	1.516697	1.462439
3	0.813843	1.424134	1.350932	1.219655	1.099390
4	1.372533	1.543694	1.259563	1.145275	1.060234
5	0.661309	0.989953	0.877226	0.696627	0.643183
6	1.462397	1.611813	1.459637	1.415300	1.558000
7	1.098970	1.492984	1.306933	1.129981	1.018785
8	1.968905	1.952779	1.756417	1.752835	1.708878
9	1.633204	2.244388	1.781382	1.701024	1.787490
10	1.156123	1.634232	1.527885	1.603753	1.548015
11	1.665394	1.941962	1.680889	1.764827	1.709802
12	0.257066	0.277713	0.239879	0.251071	0.240230
13	0.185479	0.301987	0.562779	0.521911	0.429803
14	0.352294	0.461140	0.293296	0.313753	0.273661
15	0.465864	0.542650	0.551740	0.732079	0.747442
16	0.717319	0.167095	0.347562	0.473240	0.455739
17	0.339843	0.562206	0.552403	0.569235	0.487562
18	0.921255	0.856390	0.974958	1.112171	1.063151
19	1.017654	2.242665	0.913050	1.083147	1.075284
20	1.314753	0.672685	1.148243	1.088304	1.146063
21	0.632423	0.645412	0.710267	0.764540	0.757616
22	0.773353	0.638434	0.760161	0.806891	0.839623
23	1.286802	0.265761	0.762686	0.937570	0.953194
24	1.049178	1.093016	0.810453	0.767581	0.939613
25	1.131511	0.709693	0.876061	0.836301	0.899844
26	1.479876	0.883713	1.254690	1.216415	1.127728
27	0.989378	1.324062	1.399646	1.410578	1.363055
28	1.202503	0.444093	0.592635	1.461072	1.380460
29	1.224745	1.501793	0.938070	1.072457	0.931357
30	1.001285	1.395810	1.139683	0.955619	0.958732
31	0.822759	0.870554	0.899472	1.020025	1.006869
32	0.924966	0.848433	1.029637	0.954085	1.031086
33	1.049723	0.514564	1.121414	1.017367	1.140671
34	0.676582	0.635525	0.696021	0.629096	0.894880
35	0.542640	0.481820	0.817986	0.681143	0.801739
36	0.564224	0.637091	1.228671	1.237368	1.219316
37	0.640775	0.549589	0.642159	0.703628	0.805761
38	0.871430	0.526610	0.908553	0.767835	0.933104
39	0.667799	0.470058	0.729642	0.649817	1.045285
40	1.237835	1.515576	1.084671	1.198180	1.022933
41	1.222673	1.012746	1.089356	1.016297	0.877803
42	1.114827	1.038314	1.259968	1.015745	1.024868
43	1.556438	1.423239	1.365535	1.398013	1.309330
44	0.625009	0.631486	0.654231	0.504199	0.470826
45	1.632831	1.572137	1.652482	1.428426	1.392220
46	1.237562	1.183498	1.241060	1.167562	1.132353
Compl. Imp.	0.789914	0.749073	0.567942	0.461000	0.461053

Compl. Imp. = Complementary Imports

observe from this table that during the pre-liberalisation phase the FILs increased in 21 sectors mostly the primary and agro-based manufacturing sectors, cement, non-metallic mineral products etc. After 1984-85 although, the FILs increased in almost same number of sectors, but those comprised of mostly the secondary sectors. But after 1991-92, we find that FILs increased in 15 sectors only and these sectors are forestry, crude petroleum, cotton textiles, rubber, paper, plastic, petroleum products, machinery and other transport equipment sectors. Thus we observe that after trade-liberalisation the FILs have gone up in the sectors providing basic industrial inputs and machinery.

Further we find that the FILs due to complementary imports have gone down gradually over the years. It indicates that the stimulus of essential imports for income generation in down-line production stream is going down with the trade-liberalisation. It may also be due to the change in technology also since there is regular trend towards declining FILs of complementary imports even before the period of trade liberalisation .

For comparing the inter-temporal position of the income generation potential in the down-line production stream vis-a-vis the trade liberalisation we shall analyse the forward income multipliers (FIM) as given in Table 5.16. From this table we observe that the overall forward income multipliers increased during the pre-liberalisation period. The same decreased marginally during the early phase of mild liberalisation period but it increased again in the later period during 1991-92 and thereafter. But the FIM of the complementary imports decreased

Table 5.16 : Forward Income Multipliers of the Various Sector and Complementary Imports over the Years

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	0.860697	0.835552	0.827945	0.755849	0.711660
2	1.362283	1.340969	1.102308	1.380732	1.363131
3	.6835889	1.231292	1.150227	1.110318	1.024735
4	1.152761	1.334663	1.072747	1.042606	0.988238
5	0.555424	0.855904	0.748371	0.634178	0.599507
6	1.228285	1.393557	1.242756	1.288425	1.452202
7	0.983003	1.290819	1.112735	1.028683	0.949604
8	1.654702	1.688353	1.496144	1.595702	1.592835
9	1.548393	1.940476	1.518089	1.548535	1.666109
10	0.971260	1.412941	1.301327	1.459984	1.442896
11	1.398946	1.679001	1.431478	1.606618	1.593697
12	0.215925	0.240108	0.204223	0.228563	0.223917
13	0.155778	0.261095	0.479171	0.475124	0.400617
14	0.295934	0.398697	0.249796	0.285626	0.255078
15	0.391287	0.469170	0.469822	0.666451	0.696686
16	0.602491	0.144468	0.295922	0.430816	0.424792
17	0.285459	0.486077	0.470333	0.518205	0.454454
18	0.773872	0.740426	0.830465	1.012470	0.990957
19	0.854778	1.938985	0.777663	0.986048	1.002266
20	1.104450	0.581597	0.977840	0.990743	1.068239
21	0.531278	0.558017	0.605119	0.696003	0.706169
22	0.649602	0.551984	0.647382	0.734557	0.782608
23	1.080929	0.229774	0.649852	0.853521	0.888466
24	0.881668	0.945011	0.691371	0.698771	0.875808
25	0.953238	0.613593	0.746264	0.761330	0.838739
26	1.242933	.7640493	1.076243	1.107369	1.051149
27	0.830998	1.144770	1.223922	1.284126	1.270496
28	1.010150	0.383938	0.504618	1.330093	1.286718
29	1.029488	1.298436	0.799530	0.976316	0.868112
30	0.841208	1.206803	0.970658	0.869952	0.893628
31	0.691072	0.752673	0.766312	0.928585	0.938497
32	0.777020	0.733547	0.876915	0.868555	0.961069
33	0.882481	0.444887	0.955103	0.926165	1.063213
34	0.988515	0.549469	0.593037	0.572701	0.834112
35	0.455797	0.416577	0.696543	0.620081	0.747296
36	0.473943	0.550823	1.046431	1.126443	1.136517
37	0.538227	0.475169	0.546827	0.640551	0.751045
38	0.731947	0.455302	0.773863	0.699002	0.869740
39	0.560888	0.406407	0.621246	0.591564	0.974304
40	1.039790	1.310352	0.923938	1.090768	0.953470
41	1.027131	0.875610	0.928160	0.925190	0.818195
42	0.936485	0.897716	1.073177	0.924688	0.955273
43	1.307878	1.230518	1.163623	1.272687	1.220419
44	0.525008	0.545976	0.557373	0.459000	0.438854
45	1.371496	1.359254	1.407065	1.300374	1.297680
46	1.039678	1.023241	1.056868	1.062896	1.055459
Compl.	0.663731	0.647641	0.484331	0.419674	0.429744
Imp.					
Total	39.66490	40.63573	40.14515	42.78666	43.80842

Compl. Imp. = Complementary Imports

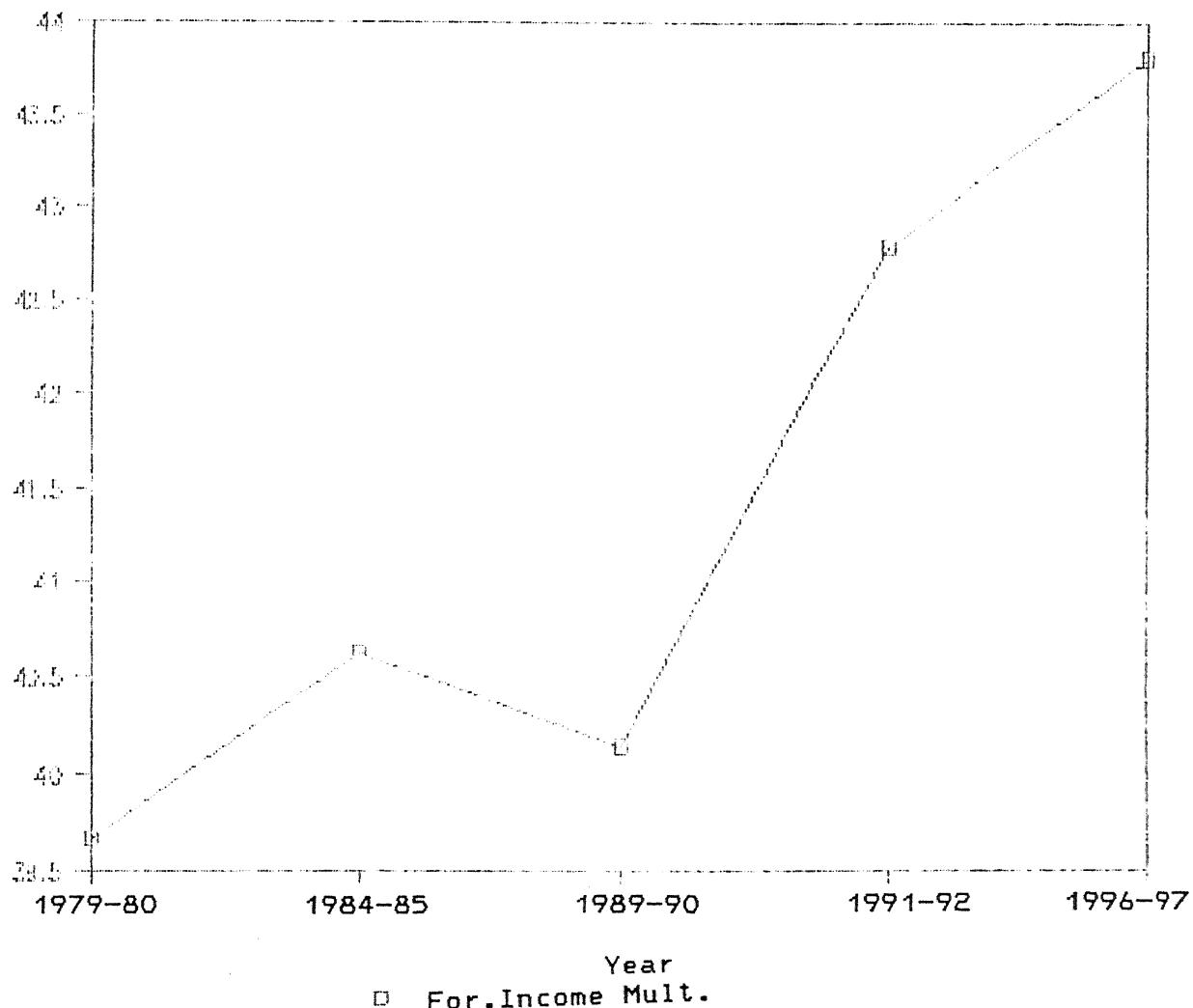
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before liberalisation and even during the early post-liberalisation period it decreased very significantly but after 1991-92 it is likely to increase albeit marginally. The Fig. 5.9 also presents in graphical form the same position over the years.

When we analyse the same multipliers for the various sectors we find that the FIMs of 23 sectors increased, mostly among the primary sectors and agro-based industries and some chemical based sectors . But after 1984-85 the FIMs of 27 sectors increased, the sectors gaining in terms of FIMs were from agro-based industries, all types of machinery , transport equipments and service sectors. Thus there was a clear perceptible change in the trend of FIMs after 1984-85 (i.e. after the process of trade liberalisation began in India). But after 1991-92 the FIMs of 21 sectors are likely to increase, comprising of mostly secondary sectors and the same were decreasing for most of the agriculture, agro-based industries and service sectors. With regard to the number of the leading sectors in respect of the FIMs we find that there is not much change over this period. Most of the primary and service sectors provide high FIMs. Besides wood , paper products, fertilisers, pesticides, synthetic fibre & resin non-ferrous metals, other manufacturing and rail transport equipments provide high FIMs. Some of the modern sectors are gaining in terms of FIM after liberalisation while, some of the service sectors are losing in the same due to this policy. Thus overall we observe that in terms of FIMs the economy is likely to gain after the trade liberalisation.

Fig 5.9 Forward Income Multipliers**Over the Years**

Forward Income Multiplier



5.6.5 Labour Intensity

It is undoubtedly very crucial to increase employment in any economy, more so in a labour-surplus and capital starved economy like India. In this section we shall examine the Backward and Forward Labour Linkages of the various sectors and the exports/complementary imports for the different periods concerned in this study. The direct labour intensity has been going down in the Indian economy over the years. As it can be seen from Table 5.17, that the number of sectors for which the direct Labour-Output Coefficients (LOCs) increased were 14, 12 and 9 respectively during the three concerned periods and came down in the remaining sectors. As such it is evident that after the trade liberalisation the labour-intensity has decreased in comparatively more sectors after the liberalisation of trade than during the previous periods. Although we observe from this table that during the period 1989-90 to 1991-92, the LOC increased for 19 sectors, the trade liberalisation has generally affected the labour intensity adversely. However the direct labour linkages do not explain the overall employment intensity in the economy. The direct, indirect and induced employment linkages are discussed in the next paragraphs.

5.6.5.1 Overall Backward Labour Linkages

The Backward Labour Linkages (BLLs) of various sectors and that of exports for the various years are presented in Table 5.18. From this table we observe that

**Table 5.17 : Labour-Output Coefficients for Various Sectors
(in Number of Workers per Rs. One Million Worth Of Gross Output)
Over the Years**

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	52.63660	39.21760	31.25832	31.52843	25.48300
2	7.442626	5.139314	2.350664	3.609651	2.259042
3	4.767166	10.62714	6.218280	6.014894	3.789997
4	3.114307	2.894183	1.671867	1.967704	1.682390
5	8.020301	6.474395	4.053475	4.813124	4.022916
6	3.257314	4.678868	1.960512	2.058204	3.074997
7	6.515662	5.482081	3.063648	2.644605	1.539492
8	2.402334	1.860286	1.482281	1.722934	1.522630
9	0.141356	0.037535	0.106087	0.060237	0.061836
10	3.822376	2.586510	1.371459	1.311336	0.548153
11	17.36589	12.41857	10.12902	9.963548	10.32529
12	0.572569	0.548431	0.556301	0.490584	0.499153
13	0.881808	0.645882	1.687605	2.799803	3.096428
14	3.521363	3.225660	2.791798	2.530915	2.094587
15	3.828074	3.938711	2.341645	1.913881	1.394328
16	5.861482	1.525279	0.252873	0.268039	0.127034
17	1.808612	2.861345	1.135186	1.310235	1.059276
18	6.149865	3.272639	3.153346	6.027459	6.170122
19	10.53154	16.41033	15.89259	10.30696	7.294298
20	1.989009	1.534768	1.579407	2.110719	1.953263
21	3.524303	3.015310	2.329695	1.550893	0.487565
22	0.530757	0.523169	0.466417	0.334256	0.289960
23	0.947646	1.592577	2.590422	1.777120	1.358931
24	0.118101	0.047626	0.035030	0.034844	0.032862
25	0.191591	0.120435	0.088380	0.089429	0.045097
26	0.115267	0.161775	0.206740	0.281789	0.355873
27	0.569604	0.668632	0.697239	0.964339	1.193698
28	0.026940	0.248234	0.244318	0.466761	0.220230
29	2.526733	0.666362	0.425756	0.367475	0.258325
30	1.701328	1.720249	0.562998	0.478090	0.330600
31	4.541532	5.575962	4.682035	6.032058	3.696565
32	1.221711	0.521051	0.809370	0.514704	0.362971
33	0.169889	0.382384	0.861949	0.500390	0.330395
34	1.475447	1.154357	1.064550	0.832581	0.619294
35	1.191785	0.798716	0.710859	0.683128	0.572085
36	1.100576	0.807846	0.318275	0.181598	0.135376
37	0.595055	0.506883	0.689923	0.679415	0.509029
38	0.745160	0.670837	0.697160	0.763272	0.578784
39	1.410291	0.861355	0.345656	0.312243	0.135815
40	3.288903	3.613918	1.705911	1.797056	1.272111
41	3.842222	2.259338	1.610753	1.675936	1.174253
42	3.173128	3.079455	2.659302	2.574021	1.836825
43	1.001286	1.033222	0.549639	0.521291	0.369040
44	1.942301	2.555012	3.546235	3.899294	4.299240
45	3.303765	2.725739	2.206161	1.737133	1.212565
46	5.086018	5.044684	3.659634	3.311450	2.590440
Avg.	4.108078	3.602927	2.756974	2.735083	2.223178
S.D.	7.899216	6.230929	5.058102	4.883337	4.027985
C.V.	192.2849	172.9407	183.4657	178.5443	181.1814

Table 5.18 : Backward Labour Linkages of various Sectors and Exports Over the Years

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	7.067935	5.820742	7.072588	7.585281	7.720738
2	1.035916	0.930064	0.816903	1.048118	0.948834
3	1.068560	1.713520	1.320870	1.414372	1.222826
4	0.439482	0.549889	0.498522	0.550933	0.600284
5	1.670081	1.610595	1.461766	1.634039	1.781322
6	0.513524	0.720245	0.426943	0.480879	0.851015
7	0.939692	0.799679	0.631411	0.673166	0.503774
8	0.518567	0.385949	0.614941	0.535308	0.607479
9	0.208792	0.058829	0.189210	0.108208	0.122374
10	0.893690	0.451921	0.450833	0.399277	0.289186
11	2.364401	1.740311	2.051574	2.155818	2.822500
12	0.700050	0.637561	0.745078	0.700079	0.755203
13	0.810511	0.579960	0.857197	1.028338	1.264420
14	1.415538	1.256925	1.411925	1.535540	1.574450
15	1.190797	1.107467	1.196917	1.058979	0.972383
16	0.972297	0.792514	0.477316	0.415844	0.344926
17	0.929550	1.369769	0.820900	0.806278	0.702998
18	1.423395	0.959574	1.085123	1.922462	2.168964
19	1.715807	3.604060	3.573240	2.596986	2.602544
20	0.821204	0.942334	0.938387	1.004888	1.097944
21	1.458975	1.198076	1.388771	1.063790	0.777503
22	0.715915	0.591565	0.519010	0.400611	0.286599
23	0.509095	0.677780	0.982303	0.834721	0.643574
24	1.002853	0.545502	0.722269	0.446951	0.496928
25	0.532730	0.560777	0.761301	0.551106	0.581570
26	0.537978	0.519004	0.451430	0.472899	0.549661
27	0.689790	0.897670	0.573348	0.693591	0.801842
28	0.629664	0.602828	0.488568	0.692195	0.343201
29	0.860050	0.800693	0.635643	0.571063	0.542663
30	0.856344	0.847853	0.498952	0.686781	0.590513
31	1.143648	1.510068	1.481253	1.745309	1.400637
32	0.750687	0.788801	0.844198	0.726869	0.723969
33	0.533403	0.719763	1.443888	0.866261	0.893996
34	0.606074	0.767793	0.779134	0.683682	0.680507
35	0.625999	0.761521	0.560649	0.577138	0.466877
36	0.705550	0.698683	0.216134	0.093454	0.096935
37	0.626961	0.622881	0.674620	0.578527	0.562471
38	0.506322	0.997413	0.543651	0.616485	0.636149
39	0.638619	0.682347	0.314543	0.385971	0.345213
40	0.752211	1.022619	0.654887	0.666652	0.661628
41	0.805519	0.681321	0.717657	0.740165	0.654263
42	0.851697	0.651718	0.845149	0.914090	0.827586
43	0.444976	0.385150	0.477584	0.415092	0.372842
44	0.922635	0.984658	1.281134	1.483804	1.768473
45	0.471692	0.462932	0.535352	0.535867	0.472266
46	0.944261	0.984865	0.917740	0.891539	0.878805
Exports	1.176540	1.003791	1.049166	1.010571	0.989142
Avg.	0.996162	0.999917	0.998931	0.999770	1.00236
S.D.	0.986590	0.894427	1.062424	1.108028	1.159456
C.V.	99.03912	89.45016	106.3561	110.8283	115.9182

although the direct labour linkages declined in comparatively more sectors after 1984-85 than during the period before liberalisation. However from the direct, indirect and induced labour linkages we find that the BLLs increased in 19 sectors during 1979-80 to 1984-85, i.e. the pre-liberalisation phase, while during the period from 1984-85 to 1991-92 and again during the later period ,i.e.after 1991-92, the BLLs increased in 21 sectors, although the sectors in which the BLLs increased happened to be different. During the pre-liberalisation phase the BLLs increased in tea & coffee, other crops and forestry, woollen textiles, wood, paper, plastic and coal tar products, non-metallic mineral products, metals and machinery, other transport and electronic & communication equipments,other manufacturing, construction and other service sectors. But after 1984-85 the BLLs increased in foodgrains, mining sectors, food products, cotton textiles, textile products, non-metal mineral products, other transport , other equipment , other manufacturing and all service sectors except the other services. Thus the BLLs increased more in such sectors which directly or indirectly contribute more towards exports. But after 1991-92 we find that most of the agricultural sectors except tea & coffee and fibre crops, mining sectors, agro-based and chemical based mfg. sectors, non-ferrous metals, railway equipments, other transport equipments and construction sectors show growth in BLLs while in machinery sectors, textile, rubber, leather, plastic and petroleum products based sectors BLLs decrease during the post major liberalisation period.

With regard to the BLL of the exports during the concerned periods, we observe that it decreased very significantly during the pre-liberalisation period and marginally increased after 1984-85. But it is again likely to go down after 1991-92, i.e. after the major liberalisation of trade. Thus we find that the labour intensity of exports was tending to go down in the economy because of the basic technology rather than due to the trade liberalisation.

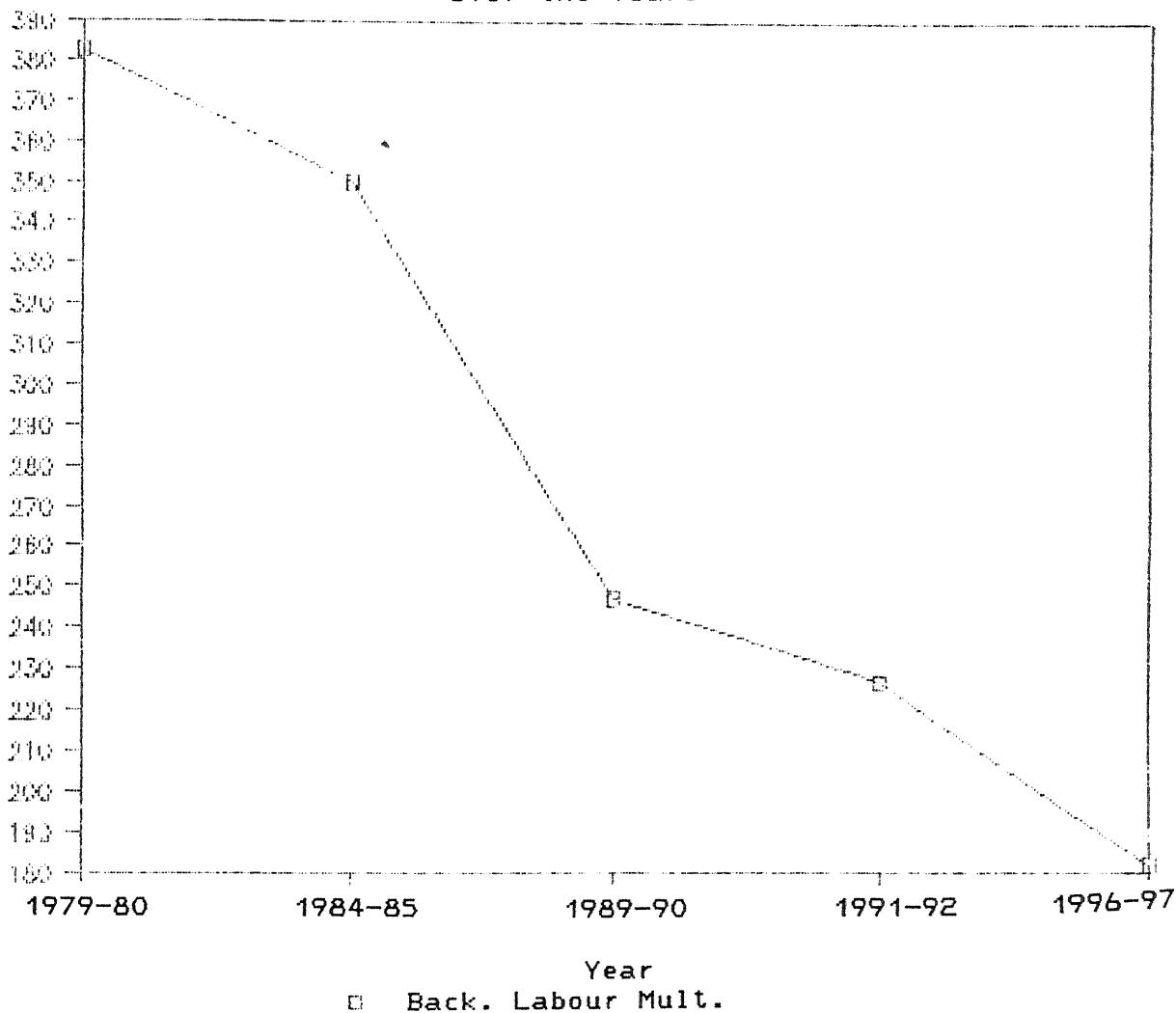
Therefore on the basis of the above analysis we find that the export-orientation and the basic technology is important for the increase in labour intensity in some sectors. We also find that even in the presence of the capital-intensive technology in some sectors, the backward labour linkages are likely to increase comparatively in future.

While with the help of BLLs we compare the relative importance of various sectors during the different periods with regard to labour intensity, the Backward Labour Multipliers (BLMs) convey us the likely overall number of jobs created for a million Rs. worth of growth in output during a given period. Table 5.19 presents the BLMs for the concerned periods. From this table we observe very clearly that there is a very significant decline in labour intensity of overall economy after the trade liberalisation. The same can also be viewed from the Fig. 5.10. Even for the BLM of the exports ,the same is true. The BLMs of most of the sectors also go down over this whole period . It may however be stated that the decline in labour intensity is much more due to the technology used rather than due to the trade liberalisation since the decline has

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**Table 5.19 : Backward Labour Multipliers of various Sectors
and Exports over the Years**

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	57.51770	43.26109	37.16496	36.59392	29.83496
2	8.430122	6.912425	4.292653	5.056471	3.666546
3	8.695766	12.73526	6.940895	6.823405	4.725321
4	3.576440	4.086874	2.619629	2.657889	2.319657
5	13.59085	11.96964	7.681275	7.883150	6.883498
6	4.178980	5.353221	2.243496	2.319922	3.288547
7	7.647061	5.943326	3.317931	3.247578	1.946715
8	4.220018	2.868378	3.231387	2.582507	2.347462
9	1.699119	0.437197	0.994259	0.522035	0.472887
10	7.272704	3.359937	2.369037	1.926246	1.117491
11	19.24111	12.93468	10.78059	10.40038	10.90688
12	5.696892	4.738305	3.915231	3.377415	2.918303
13	6.595810	4.295796	4.504393	4.961049	4.886051
14	11.51941	9.332276	7.419373	7.407957	6.084089
15	9.690511	8.230914	6.289550	5.108872	3.757544
16	7.912398	5.890204	2.508196	2.006172	1.332887
17	7.564533	10.18027	4.313657	3.889757	2.716570
18	11.58335	7.131926	5.702095	9.274598	8.381449
19	13.96295	26.78620	18.77662	12.52873	10.05691
20	6.682824	7.003744	4.931029	4.847918	4.242745
21	11.87290	8.904469	7.297700	5.132078	3.004478
22	5.826000	4.396650	2.727289	1.932685	1.107497
23	4.142931	5.037849	5.161798	4.026972	2.486940
24	8.161056	4.053897	3.795374	2.156242	1.920263
25	4.335271	4.172985	4.000479	2.658723	2.247342
26	4.377984	3.857203	2.372170	2.281427	2.124034
27	5.613400	6.671827	3.012826	3.346117	3.098529
28	5.124106	4.480656	2.567323	3.339380	1.326219
29	6.998950	5.950955	3.340172	2.754999	2.096992
30	6.968791	6.301554	2.621888	3.313264	2.281898
31	9.306821	11.22321	7.783675	8.419955	5.412429
32	6.108972	5.864062	4.436086	3.506658	2.797607
33	4.340753	5.383038	7.587331	4.179136	3.454635
34	4.932135	5.707187	4.094187	3.298313	2.629658
35	5.094283	5.661279	2.946097	2.784308	1.804136
36	5.741656	5.194899	1.135742	0.450854	0.374585
37	5.102107	4.629832	3.544986	2.791010	2.173538
38	4.120368	7.413481	2.856772	2.974131	2.458249
39	5.196983	5.072269	1.652858	1.862054	1.333996
40	6.121377	7.601152	3.441298	3.216154	2.556706
41	6.555189	5.063951	3.771140	3.570804	2.528247
42	6.930971	4.843602	4.441081	4.409878	3.198011
43	3.621144	2.862559	2.509605	2.002543	1.440761
44	7.508257	7.318471	6.732092	7.158370	6.833846
45	3.838553	3.440774	2.813162	2.585203	1.824963
46	7.684245	7.319725	4.822533	4.301083	3.395934
Exports	9.574490	7.459416	5.513149	4.875332	3.822306
Total	382.4783	349.3386	246.9751	226.7436	181.6203

| Fig 5.10 Backward Labour Multipliers**Over the Years**

been observed even during the pre-liberalisation phase though at a comparatively less extent.

5.6.5.2 Overall Forward Labour Linkages

The comparative importance of various sectors in providing the direct, indirect and induced employment potential in the down-line production stream can be studied with the help of the Forward Labour Linkages (FLLs) of the various sectors and the complementary imports for the different years. Such estimates of FLLs as derived with the help of the semi-closed Supply-driven I-O Model (as described in section 2.2.5) are presented in Table 5.20. From this table we observe that the overall labour intensity of various sectors for providing labour potential in down-line production stream declined after the liberalisation of trade. As can be seen from this table that during the pre-liberalisation phase, i.e. during 1979-80 to 1984-85 the FLLs increased in 28 sectors and decreased in the remaining 18 sectors. But after the mild liberalisation of 1984-85, we observe that the FLLs increased in 25 and decreased in 21 sectors. Further ,after the major liberalisation of trade during 1991-92, the FLLs are likely to increase in 21 sectors while in 25 sectors the same are likely to come down. So there is a trend towards declining forward labour intensity after the trade liberalisation.

With regard to the forward labour intensity of the complementary imports , we observe that, while the FLL due to the same increased significantly during the pre-liberalisation phase of 1979-80 to 1984-85, it decreased very significantly after

**Table 5.20 : Forward Labour Linkages of the various Sectors
and Complementary Imports Over the Years**

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	7.944017	4.755774	5.184362	4.799763	4.440231
2	2.010294	1.277088	0.965780	1.315252	1.193514
3	1.293350	1.984618	1.439231	1.343420	1.060461
4	0.927908	1.037132	0.790504	0.775999	0.683451
5	1.538493	1.862793	1.426026	1.386960	1.371241
6	0.845100	1.297741	1.105785	0.941601	1.396242
7	1.007850	0.991117	0.639997	0.577289	0.434382
8	1.068994	0.997306	1.277481	1.119016	1.057222
9	0.548305	1.394582	1.091283	1.092574	1.128272
10	1.185102	0.955839	0.867367	0.785320	0.676202
11	3.415470	2.156969	2.044390	1.949295	2.356943
12	0.177079	0.137730	0.128364	0.113460	0.166709
13	0.130329	0.080528	0.661217	0.752482	0.777955
14	0.706638	0.732775	0.538447	0.507012	0.457994
15	0.799741	0.612663	0.567219	0.549910	0.557952
16	1.109006	0.223057	0.126040	0.165789	0.210883
17	0.558706	0.729982	0.351117	0.431981	0.445870
18	1.467284	0.683615	0.925134	1.386753	1.500273
19	1.747603	4.201281	3.063040	2.186588	2.046286
20	0.669395	0.636400	0.855612	0.829961	0.908085
21	0.913933	0.710461	0.776038	0.665229	0.407561
22	0.274455	0.342196	0.425156	0.420799	0.415304
23	0.870966	0.286302	0.834844	0.859263	0.846633
24	1.240320	1.259300	1.021849	1.038544	1.109405
25	0.948591	0.437197	0.827874	0.765909	0.877151
26	5.017134	1.660088	3.145549	3.554998	3.320205
27	1.354866	1.532001	1.863498	2.406739	2.280305
28	0.461835	0.274551	0.244750	0.822992	0.904270
29	0.859920	1.290620	0.675300	0.737808	0.609328
30	0.372077	1.326761	0.960362	0.851066	0.964458
31	0.248276	1.172352	1.244877	1.374797	1.209847
32	0.325757	0.581490	0.785156	0.690240	0.792426
33	0.367118	0.324466	0.762125	0.641021	0.795361
34	0.225408	0.467925	0.586354	0.562415	0.858689
35	0.119957	0.279604	0.399242	0.357649	0.607735
36	0.122932	0.380258	0.596335	0.660634	0.625615
37	0.143666	0.352737	0.354525	0.374825	0.442359
38	0.150913	0.315968	0.415134	0.441382	0.527414
39	0.075837	0.173437	0.188696	0.181914	0.477560
40	0.351407	1.417609	0.726357	0.800681	0.668280
41	0.367978	0.733981	0.900624	0.947615	0.786649
42	0.366738	0.680030	0.982832	0.852880	0.783535
43	0.914289	1.029941	1.104145	1.156530	0.993049
44	0.343585	0.581644	0.823727	0.759615	0.875388
45	0.180602	0.773549	0.808961	0.697044	0.673600
46	0.377984	0.955741	0.874858	0.822166	0.801334
Clm_imp	0.852767	0.910775	0.622411	0.544795	0.476348

Clm_imp.= Complementary Imports

Avg.	1.003200	1.001939	1.008208	1.009895	1.011383
S.D.	1.355688	0.900366	0.871282	0.831188	0.774743
C.V.	135.1362	89.86234	86.41890	82.30440	76.60234

1984-85 and it is likely to come down further at a very fast rate even after 1991-92. It indicates that the effectiveness of the complementary imports in helping to generate additional employment in the down-line production stream in the domestic economy is going down after the trade liberalisation. It cautions us about the effective use of essential imports in the production processes and to critically examine our processes and the technology particularly with respect to the employment potential.

When we compare various sectors with regard to their FLLs over the different periods, we observe that the FLLs of tea & coffee, other crops, animal husbandry and forestry sectors among the agricultural sectors, crude mining, other food prod., woollen textiles, rubber products, petroleum prod., pesticides, other chemicals, cement, non-metallic mineral prod., iron & steel, all machinery, equipments and all service sectors increased during the pre-liberalisation phase. But after 1984-85, the FLLs of foodgrains, coal mining, gur and khandsari, textile prod., paper prod., chemicals, fertilisers, drugs etc., all metal based prod. and non-metallic mineral prod., machinery and equipments and the service sectors except the other services increased. So we observe that after the mild liberalisation the FLLs increased in more of such sectors which are either export-intensive or modern technology based sectors. However after 1991-92 it is likely that the FLLs in forestry, crude and non-metallic mining, agro-based industries, machinery, motor vehicles, other transport equipments, electronic and communication equipments and construction sectors will increase while in most of the agriculture sectors, leather, rubber, plastic and paper prod.,

coal and iron ores, service sectors except construction the FLLs are likely to come down. Thus we find that the comparative employment potential in the down-line stream of production in the domestic economy is likely to increase in agro-based manufacturing ,machinery and equipment sectors rather than in the agricultural or service sectors in the future.

The likely additional employment to be generated in the down-line production sectors can be gauged with the help of the Forward Labour Multipliers (FLMs) as presented in Table 5.21. From this table we observe that during the pre-liberalisation period the overall FLMs increased, but after 1984-85, there is very marked decline in FLMs although during the two-year period of 1989 to 1991, there is some increase in it. The FLMs are likely to go down again after 1991-92, i.e. after the major trade liberalisation. The Fig. 5.11 also presents the FLMs over the years. The FLMs of complementary imports also follow similar trend as they showed increase during the period 1979-80 to 1984-85 and there-after there is a secular trend towards declining FLM. It shows that the effectiveness of use of complementary imports has come down after the trade liberalisation particularly with respect to the labour intensity of the down-line production stream.

Thus we observe that the import-substitution policy might be more effective for growth in the employment in the down-line production stream. The trade liberalisation policy is likely to adversely affect both backward as well as forward labour multipliers. It is emparative to exercise caution regarding effective use of valuable essential imports particularly after

Table 5.21 : Forward Labour Multipliers of various Sectors
and Complementary Imports Over the Years

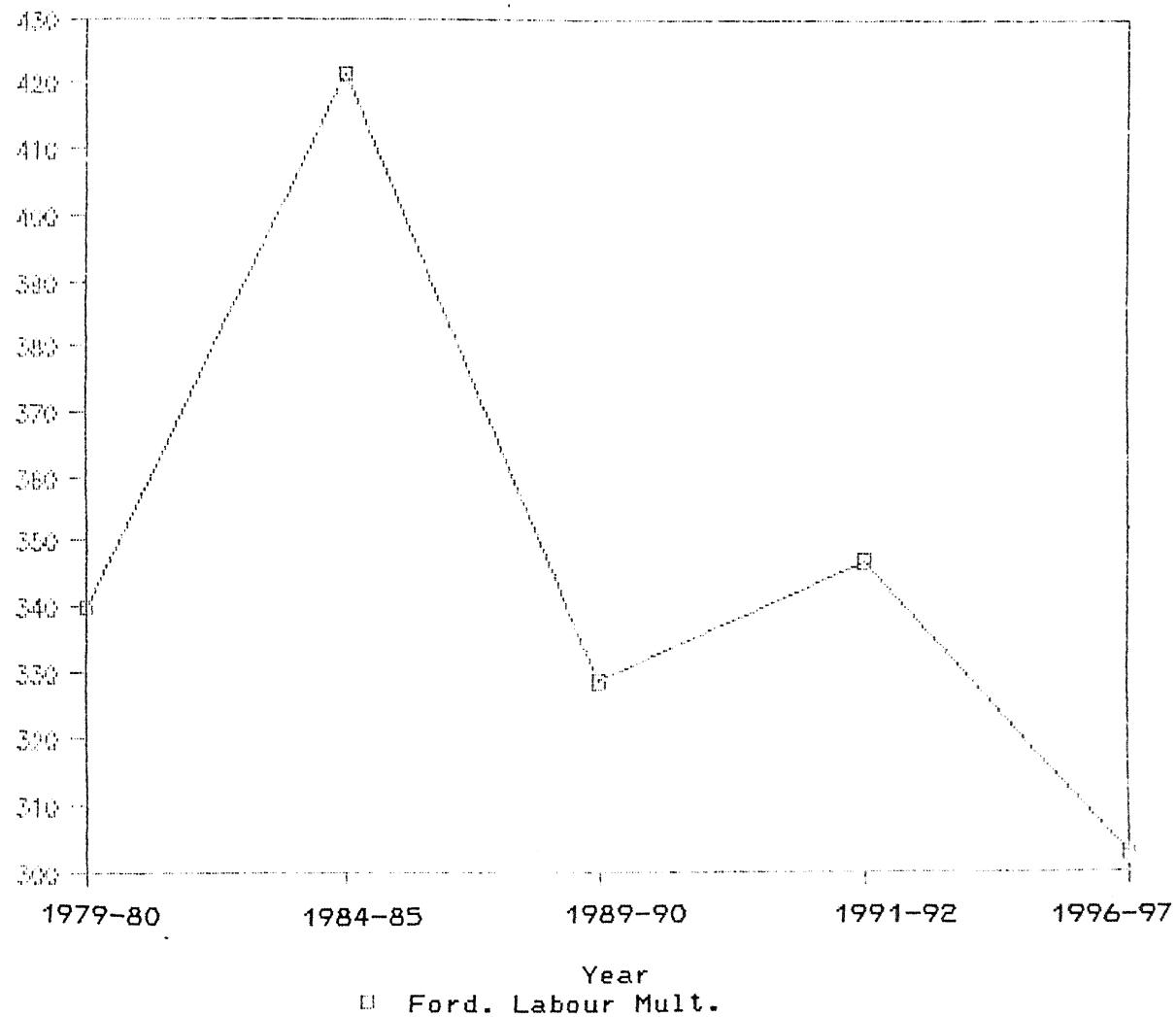
Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	57.42901	42.63985	36.21546	35.39621	28.59077
2	14.53285	11.45026	6.746480	9.699431	7.685074
3	9.349908	17.79391	10.05378	9.907156	6.828341
4	6.708052	9.298835	5.522082	5.722667	4.400766
5	11.12210	16.70164	9.961537	10.22824	8.829467
6	6.109413	11.63544	7.724486	6.943909	8.990446
7	7.285971	8.886272	4.470716	4.257264	2.796999
8	7.727988	8.941764	8.923873	8.252274	6.807487
9	3.963820	12.50370	7.623182	8.057271	7.264982
10	8.567362	8.569976	6.059009	5.791403	4.354087
11	24.69117	19.33920	14.28113	14.37523	15.17643
12	1.280145	1.234881	0.896695	0.836724	1.073448
13	0.942176	0.722014	4.618947	5.549239	5.009277
14	5.108439	6.570000	3.761337	3.739000	2.949042
15	5.781505	5.493089	3.962326	4.055357	3.592669
16	8.017247	1.999917	0.880458	1.222628	1.357882
17	4.039006	6.544962	2.452736	3.185682	2.870972
18	10.60731	6.129235	6.462543	10.22672	9.660308
19	12.63380	37.66832	21.39693	16.12516	13.17609
20	4.839202	5.705908	5.976895	6.120611	5.847190
21	6.607023	6.369938	5.421033	4.905781	2.624301
22	1.984099	3.068104	2.969936	3.103217	2.674159
23	6.296407	2.566964	5.831825	6.336704	5.451496
24	8.966546	11.29078	7.138150	7.658825	7.143492
25	6.857572	3.919875	5.783136	5.648257	5.648002
26	36.26994	14.88421	21.97329	26.21660	21.37890
27	9.794622	13.73579	13.01750	17.74868	14.68295
28	3.338706	2.461603	1.709711	6.069220	5.822621
29	6.216552	11.57158	4.717322	5.441027	3.923485
30	2.689829	11.89563	6.708630	6.276251	6.210176
31	1.794841	10.51121	8.696115	10.13854	7.790243
32	2.354970	5.213591	5.484725	5.090230	5.102458
33	2.653978	2.909134	5.323844	4.727259	5.121357
34	1.629529	4.195379	4.095988	4.147576	5.529125
35	0.867198	2.506910	2.788915	2.637516	3.913228
36	0.888708	3.409365	4.165712	4.871902	4.028356
37	1.038597	3.162615	2.476544	2.764179	2.848363
38	1.090984	2.832944	2.899929	3.255010	3.396035
39	0.548247	1.555022	1.318141	1.341539	3.075023
40	2.540403	12.71016	5.073987	5.904683	4.303075
41	2.660192	6.580816	6.291333	6.988263	5.065258
42	2.651229	6.097093	6.865596	6.289633	5.045209
43	6.609598	9.234370	7.713031	8.528924	6.394278
44	2.483853	5.214974	5.754163	5.601841	5.636651
45	1.305615	6.935582	5.651016	5.140404	4.337334
46	2.732529	8.569096	6.111339	6.063131	5.159817
Com. Imp.	6.164843	8.165934	4.347869	4.017634	3.067220
Total	339.7731	421.3979	328.3194	346.6050	302.6343

Com. Imp. = Complementary Imports

Fig 5.11 Forward Labour Multipliers 244

Over the Years

Forward Labour Multiplier



the trade-liberalisation and for the employment generation objective.

5.6.6 Cost of Production

Another important aspect of trade-liberalisation is the change in cost of production. With the help of I-O price model as described in section 2.2.6, we have estimated the direct, indirect and induced effects on price-change for the various time periods. The Table 5.22 presents the comparative figures of price-change during the concerned periods. From this table we observe that during the pre-liberalisation period, the cost of production increased in most of the sectors (in 43 sectors) and it was in the increasing trend in 40 sectors (i.e. the growth in the rate of price change was increasing over the years), while decreasing in the foodgrains, woollen textiles, coal tar products, pesticides, iron & steel and non-ferrous metals. After 1984-85 however, we observe that the growth in cost of production increased in 8 sectors viz. foodgrains, iron ore, gur and khandsari, other food prod., textile prod., paper prod., synthetic fibre and resin, other transport equipment and rail transport service sectors. While for all the other sectors it came down. We also observed that there was increasing trend in the cost of production in 12 sectors only.

After 1991-92 however, the growth in cost of production occurred in 14 sectors while decline was observed in costs per unit in 32 sectors. There were 12 sectors which showed increasing trend in the cost of production during this period. With respect to the cost of imports, we observe that while prior to 1984-85,

**Table : 5.22 : Price Change for various Sectors
and Complementary Imports over the Years**

Sec.No.	1979-80	1984-85	1989-90	1991-92	1996-97
1	0.999595	0.981847	1.033535	1.052504	1.064928
2	0.999640	1.000605	0.907227	0.938197	0.952038
3	0.998148	1.000183	0.985775	0.921426	0.918772
4	0.999817	1.023886	0.907328	0.906548	0.902698
5	0.999793	1.007936	1.025651	0.934527	0.943455
6	0.999803	1.000725	0.989824	0.986761	0.985480
7	0.999800	1.000525	1.003028	0.957049	0.929058
8	0.999805	1.001734	1.011033	0.966026	0.997476
9	0.999134	1.001004	1.020105	0.937535	0.920509
10	0.997057	1.001478	0.997403	1.049549	1.071313
11	0.998687	1.001674	0.973598	0.951746	1.012870
12	0.999232	1.014003	1.019639	0.916627	0.904450
13	0.998018	1.013912	1.025565	0.828502	0.825848
14	0.990657	1.009018	0.984367	1.023406	1.037964
15	0.999788	1.003864	1.121557	1.093404	1.042204
16	1.003298	1.000987	0.821040	0.732180	0.640176
17	0.994417	0.939595	0.957316	0.826202	0.646495
18	1.003045	1.010597	0.969753	1.174119	1.085771
19	0.999491	1.005312	1.040092	1.008397	1.010403
20	0.997061	1.004698	1.071741	0.958715	0.954107
21	0.998289	1.004361	1.231067	1.046963	1.053518
22	0.998833	1.013437	0.928875	0.735759	0.580658
23	1.004514	1.009341	1.141039	0.888515	0.644006
24	0.990053	1.008879	1.138635	0.873635	1.019235
25	0.965817	0.988581	1.131379	0.832596	0.805540
26	0.998262	1.005713	0.736530	0.790116	0.796504
27	0.996643	0.982824	0.851979	0.881510	0.839529
28	1.001362	1.013447	0.950941	1.018838	0.608463
29	1.000655	1.008406	0.921180	0.851233	0.833787
30	0.997406	1.006558	0.792313	0.832014	0.805634
31	0.997841	1.049295	1.102126	1.047867	1.021010
32	0.992869	0.999105	1.186997	0.967635	0.978401
33	0.999721	0.999896	1.515839	0.914205	0.942758
34	1.000681	1.007386	1.074678	0.913743	0.932551
35	0.996791	1.014819	1.022218	0.839159	0.738361
36	0.977107	1.003431	0.738993	0.564470	0.564101
37	0.997360	1.004103	1.072132	0.866253	0.869843
38	0.998538	1.006640	1.100528	1.044413	1.019862
39	0.997835	1.004429	0.883554	0.798158	0.756784
40	1.002614	1.039118	0.915794	0.875347	0.854037
41	0.997278	1.003615	1.101840	1.126427	1.104827
42	0.997406	1.002886	1.041656	0.940500	0.925662
43	0.998226	1.021882	1.040340	0.974658	0.941665
44	0.998145	1.007340	1.094704	0.993000	0.959013
45	0.999846	1.000820	1.051018	0.998003	0.981525
46	0.999690	1.002012	0.981006	0.947142	0.941078
Copl. Imp	0.977272	1.011128	1.004051	0.959048	0.932286

Copl. Imp=Complementary Imports

the prices of imports increased, after 1984-85 there was gradual and regular decline in the same (which is otherwise obvious by the level of trade liberalisation). So it stands confirmed with the help of price model also that the cost of imports has been reduced in India after the liberalisation of trade.

Thus we observe that the price rise is likely to be checked in the economy to a very significant extent in most of the sectors. The sectors which may expect price rise at comparatively higher rate are foodgrains, metallic and non-metallic ores, other food , wood , leather , petroleum and non-metallic mineral products, other transport equipments and rail transport service sectors. Most of the these sectors are export-oriented sectors or sectors providing the basic raw material or are affected due to the specific policy reasons e.g.foodgrains, by way of deliberate decision by the Govt. to provide attractive rates for agricultural produce to the farmers. So special efforts are needed to take care of price rise in these sectors by other measures and policy dcisions.

5.7 Loss of Potential Output

Although some of the imports provide for very valuable inputs and fixed assets ,still many of the imported goods can be produced in the economy with some efforts and proper planning even in the short-run. Such imports affect the potential output in the domestic economy adversely. The imports are utilised for intermediate use by the production sectors, private consumption, government consumption and capital formation. The adverse effects of the two types of imports used for different purposes on output

has been analysed in the following paragraphs.

5.7.1.Loss of Potential Output Due to Imports used for Intermediate Consumption

The estimated amount of loss of potential output due to intermediate use of imports during the various time periods of under different policy regimes has been presented in Table 5.23 (The method of estimation of the loss of potential output has been described in section 3.4) . From this table we observe that there has been significant loss of potential output due to intermediate imports. There was loss worth of Rs.158 billion during 1979-80, which increased to Rs. 221 billion during 1984-85 even during the policy of import restriction. Thus we see that even with the import substitution policy the loss of potential output increased. After mild level of liberalisation of trade, we observe that the said loss increased to Rs. 371 billion during 1991-92 and after the major trade liberalisation of 1991-92, there has been very marked increase in loss of potential production, i.e. upto Rs. 497 billion (all these estimates are at constant prices) . However we also observe that in this process the economy has also saved the possible imports worth of Rs. 75,114, 163 and 224 billion during these periods respectively. Even then there is net loss of potential domestic output to the tune of Rs. worth 83, 107, 208 and 273 billion during the respective periods. It has been growing at constant prices (i.e.1984-85 prices) . The loss of potential production also indicates that there is loss of corresponding employment generation and income generation in relation to the labour and income intensity as observed during the respective

**Table 5.23 Loss of Output due to Intermediate Imports over the Years
(In Rupees Million)**

Sector Number	1979-80	1984-85	1989-90	1991-92	1996-97
1	3228.072	5005.998	3992.044	2635.907	2966.508
2	3396.410	2339.446	7286.298	6575.863	7369.326
3	3794.088	1318.200	2059.040	2393.889	1287.594
4	8497.179	16357.96	15318.43	12846.59	14173.30
5	2381.833	4989.262	5239.277	3350.696	3504.536
6	1805.641	1919.977	3887.525	6876.573	9766.463
7	298.0536	938.7260	3224.475	3464.466	3743.764
8	2490.752	2152.559	7229.507	4863.100	3523.879
9	326.7058	16905.46	2336.764	5116.769	8124.912
10	828.1113	920.6127	1423.451	758.6761	778.3075
11	935.5933	1055.617	2114.147	2610.332	2927.161
12	569.0018	433.9399	257.9435	230.1203	378.3124
13	18.13702	19.45236	481.7416	235.3712	182.5610
14	14903.87	19434.72	7226.509	5910.711	5099.787
15	4121.888	4024.532	11315.16	14210.31	20592.15
16	767.1566	467.3402	5730.891	6303.321	9416.453
17	450.6111	387.5384	876.4631	975.3002	1453.186
18	11602.31	7041.082	50291.77	23744.34	33757.87
19	790.2265	2770.927	1081.402	1742.331	2600.804
20	1228.193	1225.571	3841.161	4113.499	4072.956
21	4743.278	5081.544	8714.289	10746.92	18052.11
22	802.2266	1467.464	5590.302	7128.731	8090.312
23	3009.145	312.7067	1227.250	2248.133	2857.094
24	2185.629	5629.336	11723.30	12466.58	14964.44
25	623.0768	444.2743	1279.135	1319.228	2193.683
26	2141.314	799.4621	2033.092	1531.759	1864.688
27	393.2429	325.3568	888.1063	961.1530	1260.508
28	6201.782	2638.106	7852.398	23887.32	23561.77
29	2347.245	13675.15	15442.12	27107.38	26160.80
30	1281.489	473.2685	1720.648	374.4205	1014.032
31	1241.313	1328.496	20050.88	1793.258	1857.498
32	2994.887	8491.207	5132.912	8503.956	12278.93
33	5493.626	1397.243	1347.720	2195.126	3212.722
34	2794.876	5339.705	7354.663	6583.471	10867.76
35	991.6743	1812.052	3623.034	3971.724	5141.817
36	512.9748	625.3223	1971.624	3015.897	5332.804
37	1103.519	3638.105	3127.085	3448.414	5414.429
38	615.8724	741.6560	1837.279	1606.828	2793.147
39	526.8736	576.8572	3598.783	4150.458	31566.86
40	10144.66	24660.61	9866.798	27747.51	45507.91
41	2166.872	3414.943	5878.259	3490.439	5207.471
42	5088.406	5313.652	23137.06	18392.68	23637.02
43	2731.761	4251.856	8400.369	9058.285	10162.55
44	3768.360	2538.738	3749.502	2217.520	2432.852
45	247.2569	350.3001	1263.111	1236.716	1568.443
46	31403.82	36386.50	76571.44	77415.77	94060.54
Import Savg.	75467.54	113886.2	185604.9	163288.2	223917.0
Total	157989.0	221422.8	368595.2	371557.9	496782.1

periods, which can also be estimated. It can however be stated that the imports used for intermediate consumption are by and large of comparatively essential nature and also as we have observed from this table that for substituting these imports considerable amount of alternative imports may be necessitated.

When we study the sector-wise loss of potential output over the years, we observe that during 1979-80 all agricultural sectors, e.g. cotton, silk and synthetic textiles, wood products, leather, rubber, mining based products like coal tar and petroleum products, most of the manufacturing sectors and service sectors except communication were significantly affected in terms of loss of potential output. During 1984-85 also we find that all the primary sectors, other food products, cotton textiles, textile products, most of the manufacturing and service sectors were affected as during the previous period. After the trade liberalisation during 1991-92, we observe that most of the sectors are very adversely affected in terms of loss of potential output due to intermediate imports. There are very few sectors which are affected marginally e.g. iron ore, sugar, gur & khandsari, woollen textiles, pesticides and cement sectors. After the major liberalisation of trade i.e. during 1996-97 it is likely that except iron ore, sugar, gur & khandsari sectors all other sectors will be significantly affected in this respect. Thus we see that the output is being inhibited to a significant extent in most of the sectors the trade liberalisation policy during the recent past has also contributed to it and such effect is increasing over the years.

5.7.2 Loss of Potential Output due to Imports Used for Final Demand

While the imports for intermediate use are needed for production requirement, the same used for final demand particularly the private and government consumption can not be considered as developmental in nature for the domestic economy. It is therefore important to analyse the position with regard to the adverse effects of imports of the two categories separately used for different final demands over the years. The Table 5.24 gives the overall estimated loss of potential domestic output due to competitive and complementary imports used for private , government consumption and capital formation over the years. The sector-wise estimates of potential loss of output have been presented in appendix tables 5A.16, 5A.17, 5A.18 and 5A.19 for the years 1979-80, 1984-85, 1991-92 and 1996-97 respectively.

From Table 5.24 we observe that the loss of potential domestic output has been growing over the years and it is more due to the complementary imports. While the figures for estimated loss of output due to competitive imports have been to the tune of worth Rs. 22.6 , 50.5, 153 and 308 billion during these four periods respectively, the similar figures for the complementary imports were Rs. 55, 198, 271 and 508 billion for the respective periods in that order. Further we also observe that the loss of output due to competitive imports has been predominantly more for their use for private consumption, in case of complementary imports on the other hand, the major portion of such potential output has been affected due to their use for capital formation.

Table 3.24 | Potential Loss of Output and Import Savings due Imports Used for Final Demand over the Years (in Rs. Billion)

Year	Potential Loss of Gross Output	Potential Saving of Compl. Imports		
		Pvt. Con.	Pub. Con.	F. Inv.
		Total	Pvt. Con.	Total
For The Competitive Imports				
1979-80	20.77	0.23	1.58	22.57
1984-85	41.69	1.87	6.27	49.83
1991-92	128.81	4.98	19.49	153.28
1996-97	273.55	7.64	27.85	309.05
for Complementary Imports				
1979-80	23.33	7.88	23.61	54.82
1984-85	36.94	94.82	65.65	197.40
1991-92	62.90	26.25	182.44	271.60
1996-97	134.77	31.72	341.96	508.45

Further we also observe that in the process of potential import-substitution some essential imports would be necessitated, the amount of such imports in case of substitution of competitive imports would have been insignificant during the pre-liberalisation phase, while after liberalisation process began, the same would be around 6 and 9 billion Rs. respectively during 1991-92 and 1996-97. But the saving of such imports due to complementary imports would have been Rs. 7, 19, 15 and 28 billion during these four corresponding periods . Here we clearly observe that the saving of alternative imports due to imports to be used for final demands are estimated to be comparatively much less as against those used for intermediate use. Thus we find that to increase growth of output in the domestic economy the imports used for final demand particularly all of the competitive category and those out of complementary imports which are used for consumption needs rather than capital formation could have been substituted without necessitating significant alternative imports.

Further let us now see which sectors could be significantly affected in terms of potential output growth in case of substitution of the two type of imports used for final demands ? We can see from the appendix Table 5A.16 that during 1979-80 there were a few sectors which were significantly affected due to competitive imports viz., tea & coffee, other crops, other food products, and other service sectors and all these sectors were affected due to private consumption induced competitive imports. During this period the sectors affected due to complementary imports used for final demands however were more in the capital formation, these were iron and steel, non-ferrous

metals, machinery, other transport equipments and other manufacturing sectors. The sectors affected due to use of complementary imports for consumption were other food products, petroleum products, other manufacturing and other service sectors. Thus we see that the substitutes for complementary imports could provide more extra output in many sectors, but the same were mainly for capital formation. During 1984-85 the sectors affected were more as can be seen from appendix Table 5A.17. We observe that foodgrains, other crops, animal husbandry, sugar, other food products, other service sectors are significantly affected due to use of competitive imports for private consumption, while railway equipments and electronic & communication equipments sectors were significantly affected due to use of the same for capital formation during 1984-85. However in case of use of complementary imports during this period, we observe that other crops, crude petroleum, paper and petroleum products, other chemicals, non-electric machinery, other manufacturing and other service sectors are affected due to their use for private consumption. Similarly there are many sectors in which output could have been significantly affected due to use of complementary imports, e.g. other crops, crude petroleum, other food, paper and petroleum products, other chemicals, iron & steel, non-electric machinery, other manufacturing, other transport, electricity and other service sectors. During this period the sectors affected due to use of complementary imports for capital formation have been much less in number e.g., wood products, other chemicals, iron & steel, machinery sectors, other transport equipments, other manufacturing, electricity and other service sectors. Thus we see that there are specific sectors

which are affected to a significant extent due to use of imports and special care should be taken for growth of production if necessary due to other priorities while taking decision about trade liberalisation.

When we observe the position with regard to the effect on potential output in various sectors after the liberalisation process started after 1984-85, we find from appendix Table 5A.18 that during 1991-92 many more sectors were affected due to competitive imports. The sectors affected due to use of competitive imports for private/government consumption during this period were foodgrains, other crops, animal husbandry, crude petroleum, other food products, all textile sectors, rubber and petroleum products, other chemicals, iron & steel, electric machinery, motor vehicles, electronic and communication equipment, other manufacturing, other transport, electricity, communication and other service sectors. Further due to use of competitive imports for capital formation also affected output in iron & steel, electric machinery, rail equipments, motor vehicles, electronic and communication equipment, and other service sectors. Thus there are many sectors which are adversely affected after trade liberalisation due to competitive imports for final demand. When we see the effect of complementary imports we observe that during 1991-92 iron ore, crude and non-metallic mining, textile sectors, paper, rubber, petroleum products, other chemicals, iron & steel, machinery sectors and most of the service sectors are affected on this account. Most of the secondary and service sectors are affected due to use of complementary imports for capital formation.

When we analyse the position after the major trade liberalisation i.e. during 1996-97 we observe from appendix Table 5A.19 that there are still more sectors in which the growth of output is likely if competitive imports could be substituted. In case of competitive imports we find that in addition to the sectors earlier affected, there are plastic products, synthetic fibre and resin, non-ferrous metals, other transport equipments, railway service, construction and communication sectors also affected. Further there are some sectors which are affected due to the use of competitive imports for capital formation e.g. iron & steel, rail equipments, motor vehicles, electronic and communication equipments, and other service sectors, while motor vehicles and other transport service sectors are adversely affected due to use of competitive imports for government consumption. There are many sectors in which output can be increased significantly by substituting complementary imports used for final demands. In addition to the sectors which were affected during the earlier period we observe that forestry, cotton textiles, textile products, wood products, plastic products, coal tar products, synthetic fibre and resin, and all the metal and machinery, transport manufacturing and service sectors are adversely affected due to the use of complementary imports during 1996-97. We observe here that while 13 sectors are affected due to use of complementary imports for private consumption 7 sectors are affected due to use of the same for government consumption. The number of sectors affected due to use of complementary imports for capital formation is 28. Therefore we can understand that significant additional output could have been generated in many sectors by substitution of

complementary imports used for final demand particularly that for capital formation. However it might have taken considerable time and would have needed significant additional fixed capital and other technical inputs.

5.8 Conclusions

In this chapter we have analysed the impact of liberalisation of international trade on various aspects of Indian economy in semi-closed static Input-Output model treating international trade consisting of complementary imports and exports as endogenous. We have discussed in detail the effect of trade liberalisation on the overall level as well as on the individual sectors with regard to import intensity of domestic production, export capability, structure of production, income multipliers/ linkages and labour multipliers/ linkages besides on prices/ costs of production. Further we have also analysed the factors responsible (viz. growth in final demand, growth of exports, import substitution and technical change besides the growth of labour productivity for effect on employment) behind the changing scenario with respect to growth/ decline of output, income and employment in the economy for the overall economy and the various sectors. In addition we have analysed the leakage effects of the two categories of imports used for intermediate and final demand with the help of potential loss of production due to these imports.

We have found that the liberalisation of trade to a limited extent during 1984-85 did not have very significant positive impact on the Indian economy in any economic parameter.

However the major liberalisation and the cumulative effect of gradual reduction of import duties over the years have had very profound impact on various aspects of the economy. Further it has been observed that the substitution of competitive imports may improve linkages of various sectors without significant adverse impact on requirement of essential imports . While to substitute the complementary imports, considerable amount of alternative essential imports would be necessary. We have also found that the use of competitive imports has gone up comparatively at higher rate particularly after the trade liberalisation. Further the use of competitive imports for non-developmental private consumption has increased and the same could be substituted without much difficulty in the short run with careful planning. We have observed that the trade liberalisation has helped to make the Indian economy self-sufficient in most of the sectors and after the trade liberalisation ,all the factors of growth are positively supporting the development effort in terms of output, income and employment. The new technology seems to be in tune with the trade liberalisation policy. Besides we have also analysed the scope for growth of output by reducing the leakage effects of imports and appropriate recommendations can be made on that basis to the policy makers for import substitution by type and for specific sectors. These erecommendations are presented in the section 7.4 to follow.

Besides The above general effects there have been positive impact on many aspects, however there are adverse impact also felt on a few parameters. The broad conclusions can be listed as follows.

1. The output multipliers in the domestic economy and for most of the sectors are likely to increase in more sectors and for the overall economy after the liberalisation of trade. The backward output linkages of exports are also likely to increase during this phase.
2. While the backward income linkages are likely to come down particularly after the major trade liberalisation, the forward income linkages are likely to go up after the same.
3. The labour multipliers of the economy as a whole and those of most of the sectors particularly of the secondary and tertiary sectors are however expected to decrease significantly during the period of trade liberalisation.
4. On the price front the trade liberalisation is distinctly positive in causing decreasing trend in cost of production in the economy as a whole and for most of the sectors.
5. The share of the primary and agro-based processing industries is likely to go down in the total output and gross value added of the economy after the trade liberalisation, while the share of these sectors is likely to increase in the total number of workers. This is showing the clear contrast in the sectors facilitating the employment and income growth in the economy.
6. Further the export potential of most of the secondary sectors and organised industries is not likely to increase, while that of the primary and agro-based sectors is likely to increase. On the other hand the import intensity of the former sectors is likely to increase and that for the latter, the same is not

likely to increase. This also is a contrast about the causes of adverse trade-balance in the domestic economy.

Thus we have found on the basis of the semi-closed static I-O model that there has been significant impact of the trade liberalisation on various parameters of the Indian economy. To find the likely impact of further liberalisation in the same direction in future and again with higher growth rate of imports and exports , we shall use the -Semi-Closed Dynamic Input-Output model as described in section 2.6 in chapter 2. We shall also estimate the impact on the various linkages with inclusion of the plough-back effect of the distribution of income into three income-groups i.e., wage earners, salary earners and the earners of the interest, rent and profits (or the lowest, middle and the highest income groups) and their consumption habits with the help of further endogenisation of the consumption and the net value added for the period after the major reforms in the next chapter 6. That will help in projecting the structure of production, labour and income linkages for the year 2000 A.D.

Table 5A.1 : Growth in Output due to various Factors
during 1979-80 to 1984-85 (in percentages)

Sector	Share in Growth of Output during 1979-80 to 1984-85 due to				
Number	F.D.G.	Exp.G.	Imp.Subs.	Tech.Ch.	Total
1	103.4174	2.784370	-1.65190	-4.54995	100
2 *	-768.996	125.7669	548.1009	195.1282	100
3 *	-18.9805	-3.02205	5.573378	116.4292	100
4	-43.8772	4.033461	-5.17082	145.0145	100
5	-115.123	2.185712	-6.76862	219.7062	100
6 *	57.22562	-4.38581	-6.09330	53.25349	100
7	-171.515	44.34652	30.13411	197.0352	100
8	165.1431	11.25303	6.327651	-82.7238	100
9	8.351484	39.82777	52.52852	-0.70778	100
10 *	61.73707	-4.61221	60.79833	-17.9231	100
11	129.3353	1.392253	-53.5917	22.86411	100
12	134.8954	-0.95700	-18.2392	-15.6991	100
13	102.1446	-0.05910	-0.17585	-1.90970	100
14	76.76460	13.23710	-19.1742	29.17253	100
15	198.8575	1.170635	-20.9956	-79.0326	100
16	113.6263	-1.24614	-8.17627	-4.20392	100
17 *	88.39739	10.48541	34.54356	-33.4263	100
18	305.7007	-38.2351	-172.006	4.541204	100
19 *	247.5367	-2.23955	2.948765	-148.245	100
20	149.8903	3.036751	-11.0755	-41.8514	100
21 *	77.10576	-13.8503	6.970302	29.77428	100
22	206.2516	10.83135	-26.2257	-90.8572	100
23	-2685.08	-139.093	-304.753	3228.927	100
24	50.88623	7.857187	8.400525	32.85605	100
25	104.2929	7.110168	-0.14386	-11.2592	100
26 *	-835.819	-19.2974	225.7814	729.3356	100
27 *	-2170.84	-400.185	736.2135	1934.819	100
28 *	-37.9382	-0.49081	11.72647	126.7026	100
29	5.045145	12.47700	8.799605	73.67824	100
30	-880.951	30.68482	254.0676	696.1993	100
31 *	-148.192	-11.0885	13.53582	245.7448	100
32	45.12468	0.527756	7.209997	47.13756	100
33 *	-119.765	1.832790	19.26377	198.6691	100
34	102.0466	9.635553	-32.2829	20.60077	100
35	67.87469	3.184825	0.169053	28.77142	100
36	182.9088	-6.40825	-50.6535	-25.8470	100
37	42.65433	10.63910	2.354359	44.35219	100
38	88.65330	-2.98398	6.606169	7.724510	100
39	102.3813	0.459424	-7.34467	4.503947	100
40	-370.288	121.6555	106.8329	241.7997	100
41	89.26751	14.93710	6.156177	-10.3607	100
42	177.5851	5.518642	-20.8666	-62.2372	100
43	83.97988	6.006630	-4.59755	14.61103	100
44	164.1270	3.603064	-1.43377	-66.2963	100
45	85.16409	2.850387	-3.77299	15.75850	100
46	295.7433	23.26812	-26.6864	-192.325	100
Total	103.7698	11.11795	-6.73853	-8.14929	100

**Table 5A.2 : Growth in Output due to various Factors
during 1984-85 to 1989-90 (in percentages)**

Sector	Share in Growth of Output during 1984-85 to 1989-90 due to				
Number	F.D.G.	Exp.G.	Imp.Subs.	Tech.Ch.	Total
1	79.41741	-1.70149	-2.33156	24.61563	100
2	61.68207	21.91788	14.26898	2.131056	100
3	70.01950	21.77236	29.23928	-21.0311	100
4	123.3138	3.005031	1.360530	-27.6794	100
5	104.8557	4.226762	1.153701	-10.2361	100
6	90.75615	-2.98859	-23.1440	35.37650	100
7	92.02819	30.23469	27.21360	-49.4764	100
8	96.19556	14.04350	-39.8914	29.65238	100
9 *	-93.0261	61.20604	111.4087	20.41140	100
10	-35.6495	88.43031	28.57326	18.64597	100
11	43.51486	33.95535	-12.9722	35.50199	100
12	98.37909	-1.96807	3.315442	0.273538	100
13 *	180.0304	0.022182	0.038212	-80.0912	100
14	418.5624	-82.9181	-30.9502	-204.694	100
15	55.71273	7.726001	2.075582	34.48568	100
16	53.93450	2.166899	2.255079	41.64351	100
17	92.61797	11.89730	4.270359	-8.78563	100
18	13.06702	42.02072	39.54729	5.364946	100
19	1865.141	67.44593	-218.673	-1613.91	100
20	17.27480	12.39783	16.15096	54.17639	100
21	-160.881	93.76298	106.8098	60.30847	100
22	67.79404	30.10886	21.73507	-19.6399	100
23 *	5014.486	-499.558	-198.900	-4216.02	100
24	71.59158	7.366928	21.70773	-0.66624	100
25 *	110.4368	-8.65205	132.3533	-134.138	100
26	-1.20450	0.887193	34.06645	66.25086	100
27	25.02704	11.03895	11.87746	52.05653	100
28	124.1093	10.42011	-2.74973	-31.7797	100
29	155.1854	8.068194	-10.5886	-52.6650	100
30	57.98231	6.344888	9.200044	26.47275	100
31	35.45755	83.50588	78.14567	-97.1091	100
32 *	-127.616	0.436387	123.3896	103.7902	100
33 *	41.69185	-2.27784	72.31872	-11.7327	100
34	339.9612	27.80375	-220.908	-46.8569	100
35	59.51345	4.046739	-16.2680	52.70786	100
36	31.33609	0.929273	-3.06953	70.80415	100
37	381.1284	-11.2803	-94.2159	-175.632	100
38	200.1513	28.53834	-92.7583	-35.9312	100
39	80.23558	10.17553	5.946102	3.642779	100
40	283.1924	-34.4069	-203.709	54.92366	100
41	90.75599	23.68582	-10.0856	-4.35615	100
42	13.95801	25.64560	-2.09177	62.48815	100
43	67.53323	6.176210	-9.24310	35.53366	100
44	130.0792	5.746281	-1.22602	-34.5994	100
45	97.47734	20.47273	-4.73933	-13.2107	100
46	101.9279	12.90191	2.513162	-17.3429	100
Total	103.5450	9.971280	-9.97292	-3.54343	100

Table 5A.3 : Growth in Output due to various Factors
during 1991-92 to 1996-97 (in percentages)

Sector	Share in Growth of Output during 1991-92 to 1996-97 due to				
Number	F.D.G.	Exp.G.	Imp.Subs.	Tech.Ch.	Total
1	97.47256	3.522497	1.470435	-2.46549	100
2	42.60064	56.17459	37.46750	-36.2427	100
3	137.5668	-45.1335	-130.776	138.3427	100
4	133.6322	18.14100	7.197382	-58.9706	100
5	93.32479	6.671666	-4.59903	4.602570	100
6	60.12513	119.5221	-0.83318	-78.8140	100
7	73.55982	23.78328	4.516342	-1.85945	100
8	116.5795	28.85351	11.66747	-57.1005	100
9	70.80431	15.88620	-40.9914	54.30095	100
10	49.92860	53.64181	37.59620	-41.1666	100
11	30.73878	8.984780	5.106331	55.17009	100
12	60.71753	2.125356	-0.72256	37.87967	100
13	174.2936	6.361031	-3.55360	-77.1010	100
14	135.7994	7.922418	-5.82871	-37.8931	100
15	49.46060	29.03842	18.79752	2.703446	100
16	85.90978	11.97098	3.832111	-1.71287	100
17	74.11898	18.46312	11.99194	-4.57405	100
18	20.10049	53.09024	41.74762	-14.9383	100
19	53.28611	10.65545	3.584778	32.47365	100
20	60.76391	15.95471	-0.22033	23.50169	100
21	79.29307	40.22480	-56.9387	37.42087	100
22	80.61266	20.94941	-22.5797	21.01766	100
23	38.70394	17.35779	2.843010	41.09525	100
24	86.93583	19.51775	-51.5594	45.10581	100
25	62.88012	14.67201	7.051401	15.39645	100
26	68.18745	9.932367	5.183602	16.69657	100
27	40.98593	29.73852	17.62296	11.65256	100
28	9.026838	14.69084	2.486252	73.79606	100
29	60.70579	34.51318	17.76304	-12.9820	100
30	52.32758	4.974157	2.053441	40.64481	100
31	55.18715	6.334082	-0.93014	39.40890	100
32	46.44929	15.83106	7.675757	30.04388	100
33	43.89012	31.73772	17.77245	6.599700	100
34	35.83051	13.41226	-13.2115	63.96879	100
35	29.01574	11.94027	0.350430	58.69355	100
36	57.26576	28.05184	19.40395	-4.72156	100
37	49.78708	5.766107	0.671027	43.77577	100
38	32.18812	12.01238	11.14837	44.65112	100
39	9.283002	20.50855	23.04548	47.16296	100
40	33.74697	44.05011	38.83687	-16.6339	100
41	99.64481	41.02308	30.85774	-71.5256	100
42	55.73098	9.820737	-10.3015	34.74979	100
43	87.07166	15.56175	5.485886	-8.11931	100
44	100.8672	3.212185	0.718320	-4.79779	100
45	73.16047	12.88349	-1.34760	15.30363	100
46	78.27433	17.66283	4.154865	-0.09203	100

Total 66.18645 20.15735 4.734265 8.921924 100

Table 5A.4 : The Shares of Various Factors in Growth of Employment
for Various Sectors during 1979-80 to 1984-85 (in percentages)

Sector Number	Labour Growth	Pro. Final Dem.	Growth in	Export Growth	Import Substn.	Technical Change
1	-544.957	666.9991	17.95801	-10.6540	-29.3452	
2 *	90.39512	-73.8610	12.07975	52.64438	18.74181	
3 *	-162.411	-49.8072	-7.93022	14.62520	305.5241	
4	-52.6768	-66.9903	6.158162	-7.89465	221.4037	
5 *	311.0234	242.9372	-4.61236	14.28338	-463.631	
6 *	-162.764	150.3685	-11.5243	-16.0110	139.9311	
7 *	257.9931	270.9833	-70.0644	-47.6098	-311.302	
8	-8546.73	14279.49	973.0194	547.1350	-7152.91	
9	-80.8886	15.10688	72.04390	95.01812	-1.28030	
10 *	26.92071	45.11701	-3.37057	44.43098	-13.0981	
11	-87.9929	243.1412	2.617337	-100.748	42.98291	
12	-16.2694	156.8420	-1.11270	-21.2066	-18.2533	
13	-291.547	399.9453	-0.23140	-0.68857	-7.47740	
14	-96.5212	150.8587	26.01372	-37.6814	57.33023	
15	22.12094	154.8684	0.911679	-16.3511	-61.5498	
16 *	1386.179	-1461.43	16.02760	105.1615	54.07006	
17	233.3688	-117.894	-13.9842	-46.0703	44.58035	
18 *	165.2332	-199.418	24.94205	112.2055	-2.96237	
19	417.6005	-786.178	7.112826	-9.36529	470.8300	
20	-242.160	512.8651	10.39055	-37.8962	-143.199	
21 *	28.11206	55.42974	-9.95673	5.010806	21.40411	
22	-9.36488	225.5668	11.84569	-28.6817	-99.3659	
23	105.6510	151.7341	7.860191	17.22165	-182.467	
24	-614.926	363.7990	56.17310	60.05757	234.8965	
25	-380.532	501.1611	34.16664	-0.69131	-54.1043	
26	130.9363	258.5722	5.969938	-69.8485	-225.630	
27	104.5080	97.86238	18.04048	-33.1887	-87.2221	
28	134.9963	13.27699	0.171768	-4.10383	-44.3412	
29	-908.748	50.89281	125.8615	88.76585	743.2278	
30	28.86704	-626.647	21.82702	180.7258	495.2271	
31	133.4603	49.58556	3.710253	-4.52912	-82.2269	
32	-695.549	358.9891	4.198565	57.35908	375.0025	
33	222.5943	146.8260	-2.24689	-23.6162	-243.557	
34	-136.454	241.2943	22.78374	-76.3346	48.71154	
35	-124.091	152.1016	7.136934	0.378835	64.47441	
36 *	146.6948	-85.4090	2.992325	23.65260	12.06926	
37	-44.4964	61.63399	15.37312	3.401965	64.08734	
38	-25.2729	111.0585	-3.73812	8.275741	9.676721	
39	-119.287	224.5091	1.007459	-16.1059	9.876580	
40	31.40981	-253.981	83.44378	73.27691	165.8509	
41 *	289.1585	-168.857	-28.2548	-11.6449	19.59833	
42	-10.7015	196.5896	6.109224	-23.0996	-68.8975	
43	8.922604	76.48669	5.470682	-4.18733	13.30735	
44	64.25724	58.66352	1.287834	-0.51246	-23.6961	
45	-233.502	284.0243	9.506112	-12.5830	52.55501	
46	-11.1294	328.6580	25.85773	-29.6564	-213.729	
Total	-334.460	455.8243	20.37908	-30.1817	-11.5609	

* denotes that there was overall decline in employment in these sectors

Table 5A.5 : The Shares of Various Factors in Growth of Employment
for Various Sectors during 1984-85 to 1989-90(in percentages)

Sector Number	Labour Growth	Pro. Final Dem.	Growth in Export Growth	Import Substn.	Technical Change
1	-536.232	505.2790	-10.8254	-14.8341	156.6125
2 *	447.8917	-214.586	-76.2505	-49.6406	-7.41376
3 *	880.7226	-546.658	-169.981	-228.277	164.1949
4	669.1462	-701.836	-17.1030	-7.74340	157.5364
5 *	-473.410	601.2535	24.23669	6.615444	-58.6953
6 *	-580.672	617.7518	-20.3425	-157.535	240.7979
7 *	-920.898	939.5140	308.6653	277.8231	-505.104
8	-333.091	416.6145	60.82119	-172.766	128.4218
9	254.7880	143.9934	-94.7396	-172.447	-31.5944
10 *	215.6960	41.24512	-102.310	-33.0581	-21.5726
11	-65.0132	71.80527	56.03082	-21.4058	58.58297
12	4.367984	94.08190	-1.88210	3.170624	0.261590
13	243.8847	-259.036	-0.03191	-0.05498	115.2391
14	229.1734	-540.671	107.1083	39.97957	264.4104
15	-15276.1	8566.499	1187.965	319.1456	5302.587
16 *	-2208.00	1244.813	50.01224	52.04744	961.1361
17	-440.114	500.2432	64.25908	23.06483	-47.4525
18 *	-4.60288	13.66848	43.95489	41.36761	5.611888
19	-32.3835	2469.141	89.28735	-289.487	-2136.55
20	8.037609	15.88632	11.40134	14.85281	49.82190
21 *	510.2881	660.0770	-384.698	-438.228	-247.438
22	-30.9704	88.79275	39.43369	28.46651	-25.7225
23	101.4395	-72.1869	7.191491	2.863305	60.69258
24	-173.174	195.5701	20.12458	59.30004	-1.82002
25	63.86718	39.90392	-3.12623	47.82299	-48.4678
26	32.68558	-0.81080	0.597209	22.93163	44.59637
27	5.757321	23.58615	10.40341	11.19364	49.05946
28	-3.13028	127.9943	10.74629	-2.83580	-32.7745
29	-220.322	497.0933	25.84420	-33.9178	-168.697
30	995.3382	-519.137	-56.8082	-82.3715	-237.020
31	-32.9762	47.15013	111.0430	103.9152	-129.132
32	438.0454	431.4011	-1.47518	-417.113	-350.858
33	-1871.48	821.9502	-44.9073	1425.755	-231.309
34	-91.9825	652.6660	53.37834	-424.104	-89.9571
35	-40.3045	83.50008	5.677759	-22.8248	73.95153
36 *	4381.707	-1341.72	-39.7887	131.4283	-3031.62
37	75.51055	93.33624	-2.76250	-23.0729	-43.0113
38	13.57515	172.9804	24.66421	-80.1662	-31.0535
39	-273.614	299.7715	38.01723	22.21548	13.60994
40	727.2381	-1776.29	215.8135	1277.741	-344.502
41 *	369.6740	-244.745	-63.8745	27.19841	11.74742
42	-93.8069	27.05159	49.70295	-4.05400	121.1063
43	-2016.51	1429.351	130.7204	-195.631	752.0753
44	71.34415	37.27530	1.646645	-0.35132	-9.91477
45	-283.200	373.5339	78.45165	-18.1611	-50.6236
46	-252.794	359.5959	45.51721	8.866295	-61.1850

* denotes that there was overall decline in employment in these sectors

Table 5A.6 : The Shares of Various Factors in Growth of Employment
for Various Sectors during 1991-92 to 1996-97 (in percentages)

Sector Number	Labour Pro. Growth	Growth in Final Dem.	Export Growth	Import Substn.	Technical Change
1	420.2632	-312.168	-11.2812	-4.70926	7.896079
2	426.7102	-139.180	-183.528	-122.410	118.4087
3	135.0104	-48.1627	15.80145	45.78521	-48.4343
4	-405.116	674.9984	91.63314	36.35514	-297.870
5	-487.606	548.3823	39.20312	-27.0242	27.04499
6	89.77043	6.150537	12.22658	-0.08523	-8.06233
7	209.9666	-80.8912	-26.1536	-4.96647	2.044777
8	-120.974	257.6113	63.75898	25.78218	-126.177
9	5.597869	66.84078	14.99691	-38.6968	51.26125
10	159.0199	-29.4678	-31.6593	-22.1892	24.29653
11	1.014988	30.42679	8.893586	5.054503	54.61012
12	6.706602	56.64545	1.982817	-0.67410	35.33923
13	36.50986	110.6592	4.038627	-2.25618	-48.9515
14	493.4993	-534.369	-31.1746	22.93594	149.1094
15	5307.412	-2575.61	-1512.15	-978.864	-140.779
16	153.9731	-46.3682	-6.46112	-2.06831	0.924495
17	-144.682	181.3561	45.17602	29.34217	-11.1919
18	3.216062	19.45405	51.38283	40.40499	-14.4579
19	11227.01	-5929.15	-1185.63	-398.878	-3613.34
20	-29.0398	78.40966	20.58794	-0.28431	30.32655
21	196.8067	-76.7610	-38.9403	55.12056	-36.2259
22	-50.1543	121.0434	31.45646	-33.9044	31.55894
23	-143.567	94.27031	42.27797	6.924657	100.0947
24	-25.2583	108.8943	24.44761	-64.5824	56.49880
25	162.4900	-39.2938	-9.16854	-4.40642	-9.62125
26	40.83636	40.34217	5.876349	3.066807	9.878298
27	26.54069	30.10798	21.84571	12.94571	8.559895
28	251.6072	-13.6853	-22.2723	-3.76933	-111.880
29	-322.430	256.4396	145.7941	75.03649	-54.8400
30	500.3569	-209.497	-19.9143	-8.22109	-162.724
31	268.5986	-93.0447	-10.6791	1.568209	-66.4428
32	-1166.00	588.0514	200.4223	97.17564	380.3577
33	-742.168	369.6289	267.2852	149.6741	55.58062
34	-1979.84	745.2176	278.9537	-274.779	1330.449
35	-80.5118	52.37683	21.55360	0.632567	105.9487
36	3550.385	-1975.88	-967.896	-669.511	162.9122
37	-269.412	183.9195	21.30069	2.478854	161.7129
38	-180.748	90.36774	33.72461	31.29891	125.3574
39	299.9241	-18.5589	-41.0015	-46.0734	-94.2901
40	-120.626	74.45484	97.18633	85.68452	-36.6989
41	394.9137	-293.866	-120.982	-91.0037	210.9389
42	4426.429	-2843.80	-424.887	445.6878	-1503.42
43	1039.308	-817.871	-146.172	-51.5294	76.26540
44	28.33123	72.29033	2.302133	0.514811	-3.43851
45	420.3607	-234.377	-41.2736	4.317199	-49.0268
46	-468.706	445.1514	100.4497	23.62900	-0.52341
Total	-366.458	349.4810	69.40045	29.70910	17.86794

Table 5A.7 :The Shares of the various Factors in Growth of Employment
for Various Sectors during 1979-80 to 1984-85 (in percentages)

Sector Number	Lab. Prod. Growth	Growth in Final Dem.	Growth in Exports	Import Substn.	Technical Change
1	-544.957	666.9991	17.95801	-10.6540	-29.3452
2 *	90.39512	-73.8610	12.07975	52.64438	18.74181
3 *	-162.411	-49.8072	-7.93022	14.62520	305.5241
4	-52.6768	-66.9903	6.158162	-7.89465	221.4037
5 *	311.0234	242.9372	-4.61236	14.28338	-463.631
6 *	-162.764	150.3685	-11.5243	-16.0110	139.9311
7 *	257.9931	270.9833	-70.0644	-47.6098	-311.302
8	-8546.73	14279.49	973.0194	547.1350	-7152.91
9	-80.8886	15.10688	72.04390	95.01812	-1.28030
10 *	26.92071	45.11701	-3.37057	44.43098	-13.0981
11	-87.9929	243.1412	2.617337	-100.748	42.98291
12	-16.2694	156.8420	-1.11270	-21.2066	-18.2533
13	-291.547	399.9453	-0.23140	-0.68857	-7.47740
14	-96.5212	150.8587	26.01372	-37.6814	57.33023
15	22.12094	154.8684	0.911679	-16.3511	-61.5498
16 *	1386.179	-1461.43	16.02760	105.1615	54.07006
17	233.3688	-117.894	-13.9842	-46.0703	44.58035
18 *	165.2332	-199.418	24.94205	112.2055	-2.96237
19	417.6005	-786.178	7.112826	-9.36529	470.8300
20	-242.160	512.8651	10.39055	-37.8962	-143.199
21 *	28.11206	55.42974	-9.95673	5.010806	21.40411
22	-9.36488	225.5668	11.84569	-28.6817	-99.3659
23	105.6510	151.7341	7.860191	17.22165	-182.467
24	-614.926	363.7990	56.17310	60.05757	234.8965
25	-380.532	501.1611	34.16664	-0.69131	-54.1043
26	130.9363	258.5722	5.969938	-69.8485	-225.630
27	104.5080	97.86238	18.04048	-33.1887	-87.2221
28	134.9963	13.27699	0.171768	-4.10383	-44.3412
29	-908.748	50.89281	125.8615	88.76585	743.2278
30	28.86704	-626.647	21.82702	180.7258	495.2271
31	133.4603	49.58556	3.710253	-4.52912	-82.2269
32	-695.549	358.9891	4.198565	57.35908	375.0025
33	222.5943	146.8260	-2.24689	-23.6162	-243.557
34	-136.454	241.2943	22.78374	-76.3346	48.71154
35	-124.091	152.1016	7.136934	0.378835	64.47441
36 *	146.6948	-85.4090	2.992325	23.65260	12.06926
37	-44.4964	61.63399	15.37312	3.401965	64.08734
38	-25.2729	111.0585	-3.73812	8.275741	9.676721
39	-119.287	224.5091	1.007459	-16.1059	9.876580
40	31.40981	-253.981	83.44378	73.27691	165.8509
41 *	289.1585	-168.857	-28.2548	-11.6449	19.59833
42	-10.7015	196.5896	6.109224	-23.0996	-68.8975
43	8.922604	76.48669	5.470682	-4.18733	13.30735
44	64.25724	58.66352	1.287834	-0.51246	-23.6961
45	-233.502	284.0243	9.506112	-12.5830	52.55501
46	-11.1294	328.6580	25.85773	-29.6564	-213.729
Total	-334.460	455.8243	20.37908	-30.1817	-11.5609

* denotes that there was overall decline in employment in these sectors

Table 5A.8 : The Shares of the Various Factors in Growth of Employment
for Various Sectors during 1984-85 to 1989-90 (in percentages)

Sector Number	Lab. Prod. Growth	Growth in Final Dem.	Growth in Exports	Import Substn.	Technical Change
1	-536.232	505.2790	-10.8254	-14.8341	156.6125
2 *	447.8917	-214.586	-76.2505	-49.6406	-7.41376
3 *	880.7226	-546.658	-169.981	-228.277	164.1949
4	669.1462	-701.836	-17.1030	-7.74340	157.5364
5 *	-473.410	601.2535	24.23669	6.615444	-58.6953
6 *	-580.672	617.7518	-20.3425	-157.535	240.7979
7 *	-920.898	939.5140	308.6653	277.8231	-505.104
8	-333.091	416.6145	60.82119	-172.766	128.4218
9	254.7880	143.9934	-94.7396	-172.447	-31.5944
10 *	215.6960	41.24512	-102.310	-33.0581	-21.5726
11	-65.0132	71.80527	56.03082	-21.4058	58.58297
12	4.367984	94.08190	-1.88210	3.170624	0.261590
13	243.8847	-259.036	-0.03191	-0.05498	115.2391
,14	229.1734	-540.671	107.1083	39.97957	264.4104
15	-15276.1	8566.499	1187.965	319.1456	5302.587
16 *	-2208.00	1244.813	50.01224	52.04744	961.1361
17	-440.114	500.2432	64.25908	23.06483	-47.4525
18 *	-4.60288	13.66848	43.95489	41.36761	5.611888
19	-32.3835	2469.141	89.28735	-289.487	-2136.55
20	8.037609	15.88632	11.40134	14.85281	49.82190
21 *	510.2881	660.0770	-384.698	-438.228	-247.438
22	-30.9704	88.79275	39.43369	28.46651	-25.7225
23	101.4395	-72.1869	7.191491	2.863305	60.69258
24	-173.174	195.5701	20.12458	59.30004	-1.82002
25	63.86718	39.90392	-3.12623	47.82299	-48.4678
26	32.68558	-0.81080	0.597209	22.93163	44.59637
27	5.757321	23.58615	10.40341	11.19364	49.05946
28	-3.13028	127.9943	10.74629	-2.83580	-32.7745
29	-220.322	497.0933	25.84420	-33.9178	-168.697
30	995.3382	-519.137	-56.8082	-82.3715	-237.020
31	-32.9762	47.15013	111.0430	103.9152	-129.132
32	438.0454	431.4011	-1.47518	-417.113	-350.858
33	-1871.48	821.9502	-44.9073	1425.755	-231.309
34	-91.9825	652.6660	53.37834	-424.104	-89.9571
35	-40.3045	83.50008	5.677759	-22.8248	73.95153
36 *	4381.707	-1341.72	-39.7887	131.4283	-3031.62
37	75.51055	93.33624	-2.76250	-23.0729	-43.0113
38	13.57515	172.9804	24.66421	-80.1662	-31.0535
39	-273.614	299.7715	38.01723	22.21548	13.60994
40	727.2381	-1776.29	215.8135	1277.741	-344.502
41 *	369.6740	-244.745	-63.8745	27.19841	11.74742
42	-93.8069	27.05159	49.70295	-4.05400	121.1063
43	-2016.51	1429.351	130.7204	-195.631	752.0753
44	71.34415	37.27530	1.646645	-0.35132	-9.91477
45	-283.200	373.5339	78.45165	-18.1611	-50.6236
46	-252.794	359.5959	45.51721	8.866295	-61.1850

* denotes that there was overall decline in employment in these sectors

Table 5A.9 : Shares of Various Factors in Growth of Employment
for various Sectors During 1991-92 to 1996-97 (in percentages)

Sector Number	Lab. Prod. Growth	Growth in Final Dem.	Growth in Exports	Import Substn.	Technical Change
1	420.2632	-312.168	-11.2812	-4.70926	7.896079
2	426.7102	-139.180	-183.528	-122.410	118.4087
3	135.0104	-48.1627	15.80145	45.78521	-48.4343
4	-405.116	674.9984	91.63314	36.35514	-297.870
5	-487.606	548.3823	39.20312	-27.0242	27.04499
6	89.77043	6.150537	12.22658	-0.08523	-8.06233
7	209.9666	-80.8912	-26.1536	-4.96647	2.044777
8	-120.974	257.6113	63.75898	25.78218	-126.177
9	5.597869	66.84078	14.99691	-38.6968	51.26125
10	159.0199	-29.4678	-31.6593	-22.1892	24.29653
11	1.014988	30.42679	8.893586	5.054503	54.61012
12	6.706602	56.64545	1.982817	-0.67410	35.33923
13	36.50986	110.6592	4.038627	-2.25618	-48.9515
14	493.4993	-534.369	-31.1746	22.93594	149.1094
15	5307.412	-2575.61	-1512.15	-978.864	-140.779
16	153.9731	-46.3682	-6.46112	-2.06831	0.924495
17	-144.682	181.3561	45.17602	29.34217	-11.1919
18	3.216062	19.45405	51.38283	40.40499	-14.4579
19	11227.01	-5929.15	-1185.63	-398.878	-3613.34
20	-29.0398	78.40966	20.58794	-0.28431	30.32655
21	196.8067	-76.7610	-38.9403	55.12056	-36.2259
22	-50.1543	121.0434	31.45646	-33.9044	31.55894
23	-143.567	94.27031	42.27797	6.924657	100.0947
24	-25.2583	108.8943	24.44761	-64.5824	56.49880
25	162.4900	-39.2938	-9.16854	-4.40642	-9.62125
26	40.83636	40.34217	5.876349	3.066807	9.878298
27	26.54069	30.10798	21.84571	12.94571	8.559895
28	251.6072	-13.6853	-22.2723	-3.76933	-111.880
29	-322.430	256.4396	145.7941	75.03649	-54.8400
30	500.3569	-209.497	-19.9143	-8.22109	-162.724
31	268.5986	-93.0447	-10.6791	1.568209	-66.4428
32	-1166.00	588.0514	200.4223	97.17564	380.3577
33	-742.168	369.6289	267.2852	149.6741	55.58062
34	-1979.84	745.2176	278.9537	-274.779	1330.449
35	-80.5118	52.37683	21.55360	0.632567	105.9487
36	3550.385	-1975.88	-967.896	-669.511	162.9122
37	-269.412	183.9195	21.30069	2.478854	161.7129
38	-180.748	90.36774	33.72461	31.29891	125.3574
39	299.9241	-18.5589	-41.0015	-46.0734	-94.2901
40	-120.626	74.45484	97.18633	85.68452	-36.6989
41	394.9137	-293.866	-120.982	-91.0037	210.9389
42	4426.429	-2843.80	-424.887	445.6878	-1503.42
43	1039.308	-817.871	-146.172	-51.5294	76.26540
44	28.33123	72.29033	2.302133	0.514811	-3.43851
45	420.3607	-234.377	-41.2736	4.317199	-49.0268
46	-468.706	445.1514	100.4497	23.62900	-0.52341
Total	-366.458	349.4810	69.40045	29.70910	17.86794

Table 5A.10 : Import Intensity of Various Sectors and Exports
With and Without Competitive Imports

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Sector Number	During 1979-80		During 1984-85		During 1991-92		During 1996-97	
	With m1	Without m1						
1	0.3217	0.3234	0.4920	0.4933	0.5183	0.5191	0.4800	0.4827
2	0.2038	0.2099	0.4298	0.4313	0.5370	0.5409	0.5389	0.5421
3	0.8424	0.8465	0.1744	0.1749	0.1526	0.1551	0.1974	0.1983
4	0.0955	0.0960	0.2886	0.2896	0.2023	0.2026	0.2034	0.2047
5	0.1042	0.1045	0.1982	0.1984	0.1553	0.1559	0.1634	0.1636
6	0.1092	0.1095	0.0875	0.0877	0.0789	0.0778	0.0724	0.0723
7	0.1457	0.1464	0.1168	0.1171	0.1518	0.1450	0.3265	0.3288
8	0.1016	0.1019	0.1423	0.1427	0.2946	0.2939	0.3500	0.3518
9	0.2410	0.2420	0.0947	0.0950	0.1414	0.1401	0.1702	0.1712
10	1.4515	1.4590	0.4923	0.4942	0.3778	0.3661	0.3896	0.3417
11	0.5412	0.5468	0.2177	0.2185	0.1942	0.1916	0.3248	0.3265
12	0.4022	0.4035	0.3790	0.3802	0.2814	0.2792	0.3749	0.3761
13	0.2157	0.2161	0.4012	0.4024	0.3816	0.3813	0.4691	0.4716
14	0.4824	0.4814	0.3029	0.3021	0.4735	0.4747	0.6242	0.6241
15	0.4367	0.4376	0.3873	0.3859	0.4828	0.4784	0.5086	0.5029
16	0.2964	0.2901	0.5302	0.4915	0.3350	0.3147	0.5025	0.4919
17	0.4556	0.4175	0.3222	0.3190	0.2982	0.1675	0.2392	0.2162
18	0.3719	0.3692	0.2485	0.2465	0.3134	0.2731	0.3407	0.3322
19	0.6803	0.6828	0.3330	0.3332	0.1177	0.1089	0.1126	0.1014
20	0.6781	0.6793	0.8469	0.8495	0.5629	0.5522	0.7229	0.7263
21	0.3516	0.3454	0.3198	0.3159	0.5309	0.5037	0.5365	0.5079
22	0.6713	0.6517	0.4769	0.4879	0.5711	0.5660	0.4525	0.4525
23	0.5245	0.4815	0.7747	0.7251	0.6225	0.6192	0.4195	0.3094
24	8.1551	8.2067	5.1839	5.2042	3.8772	3.7069	2.4447	2.4636
25	0.5413	0.5370	0.4384	0.4360	0.5014	0.4993	0.4389	0.4355
26	0.8459	0.8492	2.3239	2.3325	1.8074	1.8002	1.4042	1.4135
27	1.0422	1.0462	0.5776	0.5687	0.8061	0.8477	1.0987	1.1011
28	0.7623	0.7597	1.0140	1.0135	0.9321	0.9237	0.4674	0.4647
29	1.0433	1.0455	0.9803	0.9819	1.5372	1.5421	1.1453	1.1500
30	1.0599	1.0655	1.2904	1.2953	0.2621	0.2581	1.2390	1.2479
31	0.9342	0.9350	1.5475	1.5722	2.0229	2.0554	1.7003	1.7155
32	1.4511	1.4582	1.0642	1.0677	1.1414	1.1504	1.4728	1.4809
33	1.4741	1.4824	1.2210	1.2252	1.8149	1.8264	1.6423	1.6739
34	1.2434	1.2502	1.4332	1.4383	1.5678	1.5926	1.2695	1.2760
35	0.9924	0.9931	1.0911	1.0942	1.3092	1.3329	1.0255	1.0208
36	0.8594	0.8615	1.2223	1.2107	0.1188	0.1188	0.1335	0.1328
37	0.8828	0.8852	1.0317	1.0319	1.0163	1.0276	1.1861	1.1873
38	0.9506	0.9553	1.1803	1.1842	0.9253	0.9339	2.1872	2.2032
39	0.6262	0.6044	0.6695	0.6545	0.9788	0.8518	0.6025	0.5622
40	0.4311	0.4315	0.8674	0.8702	0.8152	0.8226	2.0529	2.0667
41	0.7328	0.7364	0.8026	0.8041	0.8712	0.8721	0.8513	0.8541
42	1.5651	1.5727	1.7195	1.7259	1.5498	1.5452	1.1956	1.1823
43	0.5736	0.5766	0.5143	0.5161	0.4425	0.4366	0.4678	0.4656
44	0.5999	0.5983	0.7309	0.7320	1.4804	1.5110	1.4403	1.4465
45	0.0797	0.0800	0.1520	0.1525	0.2141	0.2043	0.1894	0.1821
46	0.2116	0.2114	0.2516	0.2522	0.2202	0.2229	0.1883	0.1876
47	9.8100	9.8721	11.449	11.494	13.331	13.691	12.661	12.768

Competitive Imports

Table 5A.11: Export Capability of Various sectors and Complementary Imports
With and Without Competitive Imports

Sector	During	1979-80		During	1984-85		During	1991-92		During	1996-97	
Number	With	Without	m1	With	Without	m1	With	Without	m1	With	Without	m1
1	0.1524	0.1635		0.1550	0.1552		0.0671	0.0694		0.0720	0.0734	
2	1.4175	1.5412		0.7094	0.7084		2.0779	2.1395		2.0788	2.1000	
3	1.1218	1.1340		1.1762	1.1671		1.7910	1.8587		0.8301	0.8464	
4	0.3964	0.4145		0.5774	0.5708		0.3847	0.3976		0.4032	0.4106	
5	0.1849	0.1947		0.2891	0.2864		0.1420	0.1454		0.1281	0.1284	
6	0.6682	0.7126		1.1293	1.1256		0.1951	0.1672		0.3390	0.2923	
7	0.2018	0.2086		0.5452	0.5447		1.5206	1.5797		1.3182	1.3464	
8	0.6110	0.5691		0.4752	0.4863		0.4774	0.436		0.5037	0.4934	
9	0.7970	0.0840		5.3570	5.3765		0.7369	0.751		0.8410	0.8449	
10	5.5531	6.0798		3.8297	3.8426		3.6374	3.7678		3.3014	3.3713	
11	1.4068	0.7111		1.3231	1.3269		1.5649	1.6063		1.8347	1.8687	
12	0.3586	0.3838		0.1769	0.1771		0.0485	0.0498		0.0749	0.0759	
13	0.0073	0.0074		0.0065	0.0064		0.0048	0.0106		0.1530	0.1551	
14	1.2226	1.2571		1.1130	1.1037		0.2838	0.292		0.2345	0.2376	
15	0.5875	0.6402		0.4364	0.4376		0.8529	0.8837		1.0500	1.0709	
16	0.9308	0.9592		0.1577	0.1578		0.5090	0.5253		0.5942	0.6009	
17	0.8024	0.8687		0.7575	0.7580		0.5238	0.4891		0.5515	0.5352	
18	2.6683	2.8943		0.8018	0.8031		2.7053	2.8058		2.9440	3.0028	
19	0.2999	0.3114		1.4827	1.4813		0.3783	0.3849		0.4122	0.4133	
20	0.5007	0.4755		0.3166	0.3163		0.4731	0.4516		0.5766	0.5680	
21	3.2364	3.5359		2.7918	2.8012		4.2797	4.3842		3.0316	3.0612	
22	0.4486	0.4724		0.5647	0.5610		1.4205	1.4627		1.1238	1.1364	
23	1.2227	0.9157		0.3155	0.3161		1.1284	1.1276		1.0968	1.0935	
24	0.4928	0.3858		0.6526	0.6526		0.7518	0.7665		0.8733	0.8778	
25	0.7324	0.7231		0.3390	0.3395		0.3779	0.3812		0.4644	0.4645	
26	0.4580	0.4340		0.2023	0.2004		0.2778	0.2837		0.2901	0.2942	
27	0.8518	0.8382		0.6704	0.6693		1.0126	1.0438		1.1731	1.1888	
28	0.7729	0.7171		0.2612	0.2516		1.6088	0.4854		1.5402	1.1399	
29	0.9089	0.7948		1.6836	1.6845		1.2357	1.2388		1.3072	1.3283	
30	0.2339	0.1977		0.2195	0.2162		0.1059	0.1081		0.1517	0.1503	
31	0.2764	0.2874		0.3364	0.3303		0.5087	0.5276		0.3012	0.3869	
32	0.5729	0.5103		0.6536	0.6551		0.5416	0.558		0.5507	0.5574	
33	0.9740	0.9175		0.4244	0.4251		0.9113	0.9363		1.0883	1.1011	
34	0.5539	0.5160		0.7143	0.7161		0.6103	0.6304		0.7723	0.7855	
35	0.4663	0.4697		0.3495	0.3506		0.4064	0.4194		0.3991	0.4047	
36	0.4566	0.5311		0.3906	0.3864		0.4816	0.4903		0.3655	0.3754	
37	0.4865	0.5147		0.8673	0.8676		0.5552	0.5296		0.5043	0.5062	
38	0.5400	0.4943		0.3226	0.3235		0.6599	0.6847		0.7496	0.7611	
39	0.5034	0.3928		0.1772	0.1719		0.5909	0.6073		1.8581	1.7261	
40	2.3335	2.3882		4.3083	4.3231		2.1670	2.2428		2.4408	2.4386	
41	0.5899	0.6213		0.6760	0.6777		0.5970	0.6116		0.9145	0.9003	
42	0.4780	0.4986		0.3323	0.3327		0.7215	0.7437		0.5690	0.6673	
43	0.5141	0.5134		0.5753	0.5746		0.4728	0.4525		0.5008	0.5043	
44	0.1640	0.1658		0.0911	0.0911		0.0655	0.0671		0.0648	0.0655	
45	0.2083	0.2174		0.2133	0.2135		0.4764	0.4878		0.5069	0.5110	
46	0.4476	0.4691		0.4570	0.4575		0.5581	0.5738		0.5694	0.5767	
pl.1mp8.1440	8.9047	7.5977		7.6272	5.9100		6.1419	4.8701		4.9759		

pl.1mp.= Complementary Imports

1 = Competitive Imports

Table 5A.12 : Coefficient of Dispersion of Backward Output
Linkages of Various Sectors over the Years

Sector Number	1979-80	1984-85	1991-92	1996-97
1	5.863807	4.765212	4.072011	3.787018
2	6.259933	4.555258	4.000782	3.765683
3	4.099949	4.388868	5.221772	4.796648
4	7.000576	5.560566	5.409412	5.237903
5	5.089971	3.986297	4.036973	3.849025
6	6.358012	5.679266	6.028527	5.945869
7	6.353964	5.840808	5.473145	4.847568
8	5.863409	5.126190	4.500686	4.094697
9	5.655624	6.025990	5.658124	5.178547
10	4.142813	4.989872	4.658660	4.283530
11	5.047257	5.469270	5.341397	4.451848
12	4.174846	3.584874	3.524614	3.435635
13	4.350631	3.633639	3.721003	3.505475
14	4.002863	3.537104	3.173684	2.818031
15	4.581356	3.495332	3.677281	3.569178
16	4.755741	2.991039	3.971013	3.822548
17	4.076296	3.252671	3.903762	4.170562
18	4.585526	3.943177	3.601223	3.350280
19	4.573760	3.943618	4.337544	4.402239
20	4.501993	3.241213	4.073320	3.985755
21	4.200289	3.353418	3.513993	3.719727
22	4.016693	3.789533	4.033191	4.302087
23	4.949593	3.166108	3.208737	3.584222
24	3.666421	3.185265	3.460049	3.216893
25	4.244097	3.172779	3.217210	3.318345
26	4.486968	3.131091	3.406216	3.385109
27	4.227487	3.191752	3.624858	3.542853
28	4.339562	3.052779	3.002901	4.219731
29	4.413971	3.623801	4.101014	3.792832
30	3.999121	2.957964	3.821164	3.744171
31	4.314875	3.034377	3.486300	3.436626
32	4.239162	3.486786	3.587286	3.767859
33	4.649613	3.238940	3.124981	2.980053
34	4.496691	3.200607	3.342211	3.263746
35	4.197375	3.063347	3.609721	3.842954
36	4.103755	2.978137	5.876397	5.683324
37	4.137112	3.449946	3.339468	3.099812
38	4.531091	3.038355	3.168734	3.333416
39	4.704437	3.677754	4.050860	5.027293
40	4.919102	3.598243	4.138371	3.913464
41	4.709547	3.437207	3.141242	3.135028
42	4.508507	4.075432	3.591352	3.380073
43	5.365088	4.305660	4.663097	4.393160
44	4.213294	3.164903	2.996220	2.870524
45	6.806915	5.447493	4.691174	4.280795
46	6.024820	4.911384	5.575722	5.543862
Exports	2.603054	1.556339	1.724608	1.616451

Table 5A.13: Backward Output Linkages Of Various Sectors and Exports
With and Without Competitive imports

Sector	During	1979-80		During	1984-85		During	1991-92		During	1996-97	
Number		With	Without		With	Without		With	Without		With	Without
		m1	m1		m1	m1		m1	m1		m1	m1
1	0.7145	0.7225	0.7263	0.7302	0.9383	0.9597	0.9758	0.9913				
2	0.6174	0.6245	0.7205	0.7246	0.8646	0.8864	0.9020	0.9158				
3	1.1437	1.1549	0.7465	0.7509	0.6550	0.6821	0.6874	0.6955				
4	0.5548	0.5614	0.6065	0.6101	0.6603	0.6823	0.6534	0.6648				
5	0.8475	0.8573	0.8849	0.8993	0.9114	0.9471	0.9226	0.9378				
6	0.6062	0.6131	0.5726	0.5761	0.5694	0.5905	0.5566	0.5663				
7	0.6106	0.6177	0.5565	0.5599	0.6255	0.6376	0.6856	0.6974				
8	0.7025	0.7166	0.6615	0.6654	0.7710	0.7927	0.8198	0.8326				
9	0.7030	0.7102	0.5497	0.5531	0.6101	0.6302	0.6464	0.6575				
10	1.0699	1.0792	0.6518	0.6556	0.7369	0.7363	0.7758	0.7887				
11	0.8067	0.8151	0.5942	0.5978	0.6489	0.6567	0.7435	0.7552				
12	1.1420	1.1537	1.0444	1.0504	1.0748	1.1094	1.0773	1.0939				
13	1.1354	1.1471	1.0047	1.0103	0.9818	1.0004	1.0038	1.0196				
14	1.2415	1.2468	1.0877	1.0895	1.2731	1.3115	1.3152	1.3282				
15	1.1020	1.1122	1.0141	1.0157	1.2777	1.3107	1.2509	1.2576				
16	0.9227	0.8276	1.1496	1.1084	1.0861	1.0908	1.0246	0.9976				
17	1.2539	1.2043	1.2495	1.2507	1.1056	0.9571	1.0197	0.9809				
18	1.0491	1.0529	0.9443	0.9452	1.1036	1.0724	1.0953	1.0922				
19	0.9493	0.9558	1.1835	1.1863	0.9081	0.9296	0.9028	0.8325				
20	1.0977	1.1054	1.2620	1.2680	1.1356	1.0608	1.1240	1.1393				
21	1.2285	1.2272	1.1137	1.1111	1.2704	1.3075	1.2898	1.2845				
22	1.2590	1.2303	1.1498	1.1461	0.9695	0.9735	0.8049	0.8127				
23	1.0442	0.9695	1.0818	1.0765	1.2118	1.2310	1.0058	0.7964				
24	1.3000	1.3094	1.0968	1.1011	1.2111	0.8438	1.3196	1.3383				
25	1.1112	1.0826	1.1744	1.1636	1.2128	1.2427	1.1747	1.1918				
26	1.0946	1.1033	1.2913	1.2977	1.1212	1.1094	1.0968	1.1109				
27	1.2276	1.2370	1.2744	1.2790	1.0972	1.1275	1.0899	1.0958				
28	1.1772	1.1784	1.1809	1.1816	1.3665	1.3687	0.9249	0.9288				
29	1.0641	1.0676	1.2442	1.2452	1.0797	1.0887	1.0295	1.0377				
30	1.1387	1.1498	1.1474	1.1530	0.9054	0.9283	0.8885	0.9009				
31	1.0798	1.0866	1.1894	1.1944	1.0478	1.0514	1.0249	1.0382				
32	1.1729	1.1796	1.2477	1.2530	1.3286	1.3518	1.4122	1.4283				
33	1.0543	1.0640	1.2359	1.2417	1.0879	1.2784	1.2466	1.2657				
34	1.0464	1.0562	1.1932	1.1989	1.2014	1.2236	1.3027	1.3175				
35	1.1032	1.1061	1.1786	1.1834	1.0797	1.1067	1.0775	1.0701				
36	1.2788	1.2879	1.2637	1.2534	0.6211	0.6446	0.6129	0.6197				
37	1.1294	1.1370	1.2622	1.2639	1.1547	1.1807	1.2239	1.2334				
38	1.0291	1.0386	1.2585	1.2644	1.1922	1.2154	1.1560	1.1704				
39	1.0265	0.9960	1.1316	1.1086	0.9876	0.8510	1.1770	1.1091				
40	0.8701	0.8764	1.0447	1.0494	0.8841	0.9090	0.8799	0.8864				
41	0.9055	0.9145	0.9841	0.9882	1.2767	1.2981	1.2743	1.2870				
42	0.9892	0.9964	0.8204	0.8243	1.0491	1.0236	1.0806	1.0771				
43	0.9619	0.9716	0.8841	0.8891	1.0399	1.0497	1.0201	1.0348				
44	1.1333	1.1396	1.0771	1.0815	1.1869	1.2241	1.1969	1.2020				
45	0.5581	0.5647	0.5959	0.5994	0.7304	0.7389	0.7956	0.7957				
46	0.7754	0.7823	0.7514	0.7550	0.6713	0.6961	0.6616	0.6693				
Exports		0.9620	0.9665	0.9135	0.9151	0.9350	0.9376	0.9457	0.9477			

m1 = Competitive Imports

Table 5A.14 : Coefficient of Dispersion of Forward Output Linkages of Various Sectors over the Years

Sector Number	1979-80	1984-85	1991-92	1996-97
1	5.886633	5.952850	6.232219	6.130267
2	3.242588	3.418086	3.086366	3.222272
3	3.340917	3.319176	3.778176	4.007987
4	4.190563	3.245107	4.137392	4.251418
5	5.307145	3.883774	4.953177	4.872331
6	3.556835	2.899506	3.704290	3.090361
7	5.319576	3.971477	4.613912	4.732441
8	2.162026	2.218425	2.356852	2.322492
9	2.259065	2.145753	2.772871	2.356841
10	2.510424	2.505578	2.773212	3.129005
11	2.410549	2.242014	2.337675	2.359033
12	5.255253	5.750274	6.097546	5.493294
13	6.687954	6.684397	4.380568	4.413552
14	4.812863	4.493812	5.762316	5.692943
15	5.528738	5.243505	5.127298	5.033106
16	4.445002	6.038332	5.560435	5.044943
17	4.868565	4.250682	5.103158	5.200975
18	3.386674	4.396579	3.743982	3.989419
19	3.609408	1.964147	3.407003	3.366612
20	3.371525	3.798904	3.702021	3.394517
21	4.031504	4.236744	4.079507	4.875075
22	3.607713	4.157576	3.732432	3.341932
23	2.761819	5.400170	3.009180	2.694746
24	2.595915	2.635101	3.046345	2.544676
25	2.259181	3.190884	2.960947	2.756994
26	3.102065	3.957124	3.558794	3.531621
27	3.021515	2.757509	2.890557	2.786341
28	3.290544	3.772914	2.671563	2.147656
29	2.488092	2.484596	3.220702	3.203836
30	3.501108	3.724513	3.988784	3.859415
31	3.876756	3.597015	3.708052	3.645093
32	3.193668	3.255117	3.450132	3.421783
33	3.106451	3.589786	2.596872	2.399385
34	4.718749	3.838949	4.597559	3.377261
35	4.986337	4.719705	4.380175	3.858759
36	4.548575	4.025328	3.206995	3.150785
37	4.339687	4.369420	4.294317	3.799579
38	4.261526	4.557371	4.730043	3.918996
39	4.783668	5.971358	5.203051	3.962904
40	3.493181	2.293002	2.961990	3.488037
41	3.306220	3.267118	3.131891	3.446095
42	3.327316	4.053015	3.772453	3.463567
43	2.961445	2.431121	3.303629	3.269139
44	4.559868	5.044471	5.566269	5.561078
45	3.940145	3.869390	3.495978	3.241636
46	4.150952	3.978981	4.387223	4.326076
Com. Imp.	1.601474	1.490503	1.535689	1.323549

Table 5A.15 Forward Output Linkages of Various Sectors and Complementary Imports With and Without Competitive imports

Sector	During	1979-80		During		1984-85		During		1991-92		During		1996-97	
Number	With	Without	m1	With	Without	m1	With	Without	m1	With	Without	m1	With	Without	m1
1	0.5662	0.6201		0.5261	0.5291		0.5144	0.5365		0.4761	0.4865				
2	1.2432	1.3442		1.1298	1.1319		1.3232	1.3636		1.2922	1.3040				
3	1.2074	1.2750		1.2670	1.2637		1.0922	1.1351		0.9433	0.9618				
4	0.7701	0.8336		0.9709	0.9700		0.7706	0.8014		0.6776	0.6909				
5	0.5828	0.6363		0.7857	0.7872		0.6001	0.6245		0.5564	0.5675				
6	0.9135	0.9807		1.0635	1.0561		0.8225	0.7767		0.9504	0.8547				
7	0.5822	0.6335		0.7701	0.7712		0.7328	0.7624		0.6822	0.6958				
8	1.6083	1.6238		1.5267	1.5088		1.3969	1.3487		1.3291	1.3185				
9	1.5742	0.6238		1.6852	1.6911		1.5614	1.6126		1.6302	1.6513				
10	1.3030	1.3278		1.2906	1.2970		1.4678	1.5245		1.4104	1.4370				
11	1.4341	0.9844		1.7062	1.7141		1.5300	1.5733		1.4963	1.5719				
12	0.5874	0.6382		0.5091	0.5109		0.4723	0.4921		0.4818	0.4921				
13	0.4775	0.5253		0.4461	0.4489		0.8368	0.8705		0.7098	0.7242				
14	0.6995	0.7344		0.7228	0.7164		0.5747	0.576		0.5061	0.5151				
15	0.6707	0.7293		0.5839	0.5869		0.7799	0.8106		0.7747	0.8102				
16	0.6972	0.7357		0.4857	0.4882		0.6791	0.7056		0.6554	0.6649				
17	0.7345	0.7936		0.8929	0.8958		0.7351	0.7154		0.6909	0.6877				
18	1.0432	1.0972		0.7531	0.7554		1.0711	1.1108		1.0788	1.0974				
19	0.9854	1.0686		2.6436	2.6503		1.0397	1.0709		1.0072	1.0168				
20	1.2308	1.2578		0.9335	0.9372		1.0759	1.0804		1.0935	1.0985				
21	0.8888	0.9336		0.7618	0.7654		1.2057	1.2355		1.0948	1.1033				
22	1.0187	1.0999		0.9186	0.9163		0.9816	1.0123		0.9539	0.9631				
23	1.4303	1.1353		0.5490	0.5516		1.1092	1.1114		1.1323	1.1320				
24	1.2596	1.1573		1.2053	1.2095		1.1409	1.1739		1.2726	1.2856				
25	1.4708	1.5327		1.1482	1.1541		1.3177	1.3321		1.3927	1.3779				
26	1.2867	1.3435		0.9204	0.9237		1.0833	1.1285		0.9996	1.0002				
27	1.4566	1.5306		1.3117	1.3154		1.2771	1.3225		1.2704	1.2919				
28	1.2405	1.2399		0.8434	0.7818		1.9214	0.773		1.7132	1.3688				
29	1.3600	1.2964		1.7575	1.7593		1.2072	1.2115		1.0757	1.0922				
30	1.2707	1.2165		1.5564	1.5441		0.9708	1.0107		0.9264	0.9422				
31	0.9779	1.0593		1.0210	1.0362		0.9212	0.9565		0.8733	0.8703				
32	1.1933	1.1732		1.2443	1.2504		1.2192	1.2642		1.2967	1.3202				
33	1.1526	1.1519		0.9654	0.9698		1.4096	1.4582		1.5739	1.5903				
34	0.7101	0.7317		0.8311	0.8346		0.7385	0.7633		1.0108	1.0283				
35	0.6400	0.6802		0.6513	0.6549		0.7631	0.7921		0.8955	0.9125				
36	0.7739	0.8359		0.8139	0.8074		1.1227	1.158		1.0976	1.1118				
37	0.7407	0.7951		0.8781	0.8797		0.7765	0.7595		0.8400	0.8462				
38	0.8176	0.8287		0.7242	0.7282		0.6914	0.7196		0.8452	0.8582				
39	0.7418	0.6924		0.6261	0.6101		0.6743	0.6905		1.3684	1.2604				
40	0.9580	0.9859		1.4960	1.5016		1.1958	1.2354		1.0888	1.1061				
41	0.9660	1.0353		0.9311	0.9354		0.9796	1.0111		0.8507	0.8646				
42	1.0034	1.0804		0.7429	0.7465		0.8864	0.9176		0.8976	0.8970				
43	1.4213	1.5135		1.3920	1.3959		1.2557	1.2641		1.1220	1.1398				
44	0.7062	0.7642		0.5913	0.5946		0.5214	0.543		0.4763	0.4863				
45	0.3571	0.9331		0.8261	0.8305		0.8790	0.909		0.8794	0.8921				
46	0.8857	0.9537		0.8326	0.8361		0.7502	0.7755		0.7165	0.7270				
Cpl.Imp	0.8585	0.8341		0.7624	0.7650		0.9218	0.9550		0.8698	0.8645				

m1 = Competitive Imports

Cpl.Imp.= Complementary Imports

**Table 5A.16: Loss of Potential Output in Various Sectors due to Imports
Used for Final Demand during 1979-80 (in Rs. Million)**

Sec. No.	Due to Competitive Imports			Due to Complementary Imports		
	Pvt.Con.	Pub.Con	F.Inv.	Pvt.Con.	Pub.Con.	F.Inv.
1	722.72	0.76	4.34	204.67	68.12	79.12
2	64.24	1.30	4.04	212.51	71.67	72.70
3	1507.75	1.45	15.36	211.84	70.57	79.38
4	1561.18	1.32	7.23	504.10	161.62	152.91
5	860.01	0.57	3.45	158.51	50.90	63.53
6	56.63	0.62	5.47	128.10	45.04	73.58
7	105.09	0.07	0.38	18.12	6.32	6.65
8	135.83	1.78	12.30	172.32	64.69	225.92
9	42.22	0.18	1.55	32.30	11.98	55.43
10	5.50	0.16	0.83	51.53	17.18	25.72
11	35.60	0.39	4.23	65.24	22.07	63.53
12	70.01	0.10	0.55	35.43	12.23	11.34
13	1.75	0.01	0.03	1.05	0.33	0.41
14	7378.62	2.45	11.20	901.89	300.56	263.71
15	66.38	0.82	3.89	256.29	85.48	79.70
16	281.88	0.19	0.69	43.54	14.58	13.79
17	21.87	0.15	0.48	27.94	9.35	9.11
18	271.52	6.76	17.54	731.77	249.52	277.36
19	87.29	0.91	14.76	65.26	23.20	81.91
20	122.64	1.06	11.13	418.83	311.87	92.58
21	27.97	0.59	3.64	296.33	98.01	89.12
22	52.11	4.86	72.27	55.61	21.07	105.50
23	59.55	1.24	19.02	153.13	41.58	119.04
24	217.30	3.65	19.97	5338.77	1757.62	330.06
25	51.78	0.71	4.65	49.77	21.31	80.97
26	644.78	0.74	6.69	126.72	43.33	48.23
27	146.54	0.15	1.52	22.23	7.40	8.46
28	436.58	3.09	13.90	332.09	94.21	164.62
29	182.94	3.65	19.60	227.59	214.12	200.21
30	21.14	0.28	2.39	20.04	7.81	27.81
31	87.96	1.04	19.68	143.39	31.88	120.76
32	145.83	9.26	40.78	237.18	88.52	1680.46
33	388.34	8.33	75.01	582.34	195.48	2053.80
34	91.18	5.05	20.41	199.66	85.04	7693.12
35	24.74	0.79	12.88	287.52	31.47	1316.56
36	10.01	0.15	87.82	33.73	11.18	18.90
37	73.66	94.30	119.89	70.00	23.77	62.75
38	15.41	0.23	1.50	40.87	202.63	1402.72
39	289.27	0.67	496.07	19.60	4.51	44.76
40	102.50	2.08	12.18	2482.05	469.16	376.46
41	109.60	1.45	10.00	177.35	58.50	159.69
42	425.08	5.67	40.28	410.27	139.46	538.26
43	276.32	3.82	25.32	259.57	98.57	396.28
44	483.15	6.70	44.35	320.68	124.05	635.10
45	21.87	0.32	2.05	19.82	6.78	23.96
46	2571.65	38.58	237.94	2516.34	855.96	2887.10
Cpl.Imp	411.45	8.76	50.78	4664.62	1549.84	1293.83
Total	20767.44	227.23	1580.06	23328.50	7880.54	23608.90

Cpl.Imp.= Complementary Imports

Table 5A.17: Loss of Potential Output in Various Sectors due to Imports Used for Final Demand during 1984-85 (in Rs. Million)

Sec. No.	Due to Competitive Imports			Due to Complementary Imports		
	Pvt.Con.	Pub.Con	F.Inv.	Pvt.Con.	Pub.Con.	F.Inv.
1	3837.31	26.95	15.59	224.77	582.17	198.64
2	118.75	5.80	7.23	104.90	261.38	99.70
3	841.70	50.58	3.72	76.88	143.52	43.50
4	6527.43	310.98	72.98	1122.76	1949.75	726.86
5	3285.19	92.33	35.26	277.27	663.64	382.47
6	66.17	3.74	14.58	138.34	330.19	205.22
7	110.11	6.28	6.60	48.67	124.08	72.11
8	149.13	6.72	49.44	310.53	706.49	597.80
9	233.96	9.48	48.01	1854.25	6408.17	592.58
10	6.96	0.34	4.62	33.41	113.18	73.13
11	25.89	1.39	23.23	76.37	229.37	345.61
12	1333.04	3.55	1.83	26.36	54.60	21.66
13	9.49	0.52	0.12	4.32	6.28	1.35
14	12846.53	773.55	42.18	845.49	2012.12	578.55
15	234.49	9.50	12.53	210.89	497.89	196.54
16	780.39	0.52	1.11	16.62	50.19	15.20
17	28.52	0.87	1.42	16.20	53.06	17.81
18	348.16	35.18	35.48	351.29	917.09	384.36
19	349.71	24.29	74.24	408.93	931.63	1323.89
20	139.65	6.65	25.27	1602.98	3800.46	255.18
21	71.27	1.24	9.12	164.96	547.81	141.66
22	112.19	5.15	131.30	64.83	205.49	275.51
23	21.62	1.00	7.79	23.40	42.56	20.18
24	580.96	22.84	86.33	6895.43	24662.53	636.94
25	27.12	1.42	22.12	85.33	222.96	332.90
26	318.23	11.21	3.68	72.88	103.80	39.27
27	75.58	3.99	1.26	32.13	42.78	14.70
28	109.74	1.13	10.67	54.37	87.10	95.47
29	751.69	33.97	157.54	7302.22	3643.87	1469.95
30	21.64	0.82	3.77	22.01	44.88	38.10
31	101.96	4.56	28.62	206.12	306.65	265.86
32	328.36	23.69	549.96	878.56	3331.01	8041.46
33	66.92	3.09	88.80	217.67	545.17	848.31
34	185.81	8.51	75.62	1014.68	2724.46	21263.04
35	59.61	1.79	67.51	357.84	876.60	4364.95
36	14.12	0.68	960.92	28.42	86.64	74.28
37	165.68	67.00	299.29	177.31	556.94	478.68
38	28.44	1.67	9.16	52.99	259.85	2007.07
39	784.98	0.17	1593.17	13.48	41.44	81.46
40	465.20	22.76	210.42	1896.76	11547.12	2997.39
41	158.12	7.66	78.86	264.51	709.25	750.41
42	540.15	26.45	89.42	496.39	1110.51	871.46
43	506.78	22.25	158.74	845.54	1616.28	1756.39
44	383.64	13.96	58.08	279.07	610.85	588.02
45	37.87	1.78	8.23	37.55	83.51	83.12
46	3839.71	185.02	878.45	3902.82	8721.74	8829.11
Cpl.Imp	657.74	27.45	202.68	3699.16	12250.59	3147.75
Total	41687.74	1870.45	6266.98	36937.56	94817.59	65647.75

Cpl.Imp. = Complementary Imports

Table 5A.18 : Loss of Potential Output in Various Sectors due to Imports Used for Final Demand during 1991-92 (in Rs. Million)

Sec.	Due to Competitive Imports			Due to Complementary Imports		
	No.	Pvt.Con.	Pub.Con	F.Inv.	Pvt.Con.	Pub.Con.	F.Inv.
1	1746.71	9.54	22.77	159.27	43.34	277.96
2	493.09	13.87	30.61	221.18	71.01	370.85
3	254.35	4.05	10.88	83.01	24.71	134.06
4	3781.84	32.78	94.20	547.49	153.87	916.77
5	3004.51	10.36	21.25	135.73	44.35	256.10
6	289.53	10.07	52.00	288.62	154.72	809.91
7	180.38	5.65	16.53	112.80	36.31	205.44
8	478.29	23.76	82.34	356.29	190.52	1470.79
9	2142.68	121.81	103.86	5745.51	1428.96	1427.67
10	337.72	2.38	9.41	36.49	18.28	170.99
11	242.66	15.19	83.61	264.16	154.61	1257.72
12	124.26	0.72	2.25	17.35	4.19	26.88
13	137.91	0.69	1.40	13.98	3.17	16.55
14	3607.02	17.27	33.01	287.35	73.31	392.66
15	1304.05	29.54	79.18	623.34	178.56	928.41
16	2488.32	15.05	43.97	187.72	61.95	386.67
17	665.80	2.45	3.87	26.40	8.97	46.00
18	2564.31	71.12	124.32	862.14	292.37	1513.66
19	326.05	8.88	61.00	179.07	79.95	642.03
20	840.83	37.21	95.85	1855.64	1654.81	664.37
21	309.37	16.06	46.51	328.41	108.40	582.78
22	1993.37	138.48	511.15	291.70	127.92	2045.28
23	658.15	10.17	62.26	199.82	58.48	335.38
24	5257.56	300.35	248.96	14213.03	3531.22	3446.48
25	103.19	7.48	37.22	116.96	64.60	786.06
26	374.92	3.87	9.74	67.21	19.81	109.72
27	91.40	2.19	6.71	90.96	15.35	75.94
28	667.55	10.21	68.73	181.73	55.23	394.09
29	2536.77	88.38	378.13	8094.27	919.92	4064.72
30	100.40	4.37	11.23	108.40	26.65	122.79
31	245.47	10.82	57.23	640.43	90.82	461.21
32	2115.50	215.33	1031.83	2124.78	1644.64	21363.39
33	584.55	31.01	266.05	563.21	337.31	3164.60
34	577.59	33.94	84.58	1640.60	2263.62	63164.65
35	3036.95	54.71	1425.35	1681.79	255.63	10538.32
36	443.65	28.25	1027.61	362.97	213.00	1166.59
37	2501.34	695.10	2179.93	137.33	62.21	2218.87
38	390.28	22.26	14.03	83.78	65.16	11611.80
39	14972.79	133.16	7869.70	169.41	90.67	542.26
40	2530.33	128.99	621.58	10441.64	7653.68	11909.49
41	652.66	35.77	90.70	368.21	182.40	1572.08
42	28487.02	1700.93	262.97	1044.40	415.84	3194.05
43	2614.64	122.78	325.62	1292.66	608.95	4559.05
44	826.58	33.64	80.93	301.50	121.45	957.03
45	1275.74	210.76	57.13	146.17	76.66	614.78
46	30756.24	506.53	1742.03	6205.42	2565.55	21525.00
Cpl.Imp	4751.54	243.79	706.76	5054.55	1606.55	8785.14
Total	128810.34	4977.96	19490.18	62900.33	26253.16	182441.88

Cpl.Imp.= Complementary Imports

Table 5A.19 : Loss of Potential Output in Various Sectors due to Imports Used for Final Demand during 1996-97 (in Rs. Million)

Sec.	Due to Competitive Imports			Due to Complementary Imports		
	No.	Pvt.Con.	Pub.Con	F.Inv.	Pvt.Con.	Pub.Con.	F.Inv.
1	2424.31	10.92	20.97	257.69	49.56	388.53
2	631.32	14.83	23.57	324.79	73.58	526.68
3	482.14	2.60	4.39	69.73	14.20	99.08
4	4793.04	37.87	79.68	809.66	169.09	1316.71
5	4671.29	11.75	17.56	202.20	44.00	335.98
6	596.91	15.37	66.59	440.60	181.79	1478.39
7	283.53	5.70	12.77	177.40	38.26	286.43
8	794.66	31.68	88.83	473.71	185.40	2534.20
9	5602.10	227.18	226.73	23447.01	2537.09	4351.88
10	52.44	2.95	7.88	42.08	15.05	240.94
11	434.06	22.24	78.34	288.61	153.71	2121.84
12	572.06	1.28	2.96	38.47	7.10	54.00
13	219.41	0.66	0.87	15.35	2.80	17.86
14	6487.47	18.28	21.89	344.39	67.35	452.08
15	2110.72	42.13	78.84	1066.01	238.12	1701.87
16	4063.70	25.39	46.28	403.04	93.32	752.75
17	1064.30	4.64	3.94	51.17	11.98	86.01
18	4015.36	96.25	123.12	1659.51	383.59	2744.06
19	720.14	13.81	85.02	297.72	96.36	1270.92
20	1808.54	57.92	127.09	3883.52	2319.36	1348.31
21	618.83	25.03	52.78	762.26	171.00	1245.06
22	4752.95	235.66	514.72	471.33	149.75	3124.71
23	1059.35	17.22	92.25	477.77	90.69	717.93
24	10490.31	438.71	342.64	46317.27	4962.79	7528.83
25	281.89	16.04	52.51	143.82	77.27	1701.64
26	533.63	4.80	9.10	110.25	24.43	176.92
27	156.59	3.02	6.49	134.26	22.06	136.97
28	1819.34	51.18	174.67	598.22	138.07	3162.22
29	4400.70	112.22	311.66	9507.77	1274.95	6386.74
30	221.25	6.59	17.04	278.79	40.61	266.77
31	528.01	16.42	71.37	597.03	98.83	863.56
32	6349.10	455.89	1343.10	2231.78	1769.76	44110.26
33	1267.92	62.34	277.65	585.60	393.81	6902.54
34	2841.49	165.84	307.48	3312.38	3671.62	118744.17
35	1717.60	58.95	254.60	1644.25	331.06	25722.33
36	892.41	35.19	1780.94	697.30	286.26	1985.68
37	8846.65	1152.21	2155.23	374.81	107.93	1719.17
38	2247.04	96.00	25.41	192.51	95.93	17878.98
39	52684.61	369.77	15223.78	1333.71	438.64	8668.57
40	5101.85	179.24	664.28	8788.72	6028.69	18117.66
41	1085.57	42.89	72.01	666.48	175.17	1909.23
42	56565.92	2434.31	340.53	2109.59	531.63	5982.82
43	4354.71	131.31	375.24	2263.86	689.63	8261.33
44	1366.80	35.18	93.26	570.65	126.91	1510.90
45	2608.48	299.70	82.48	275.19	91.04	1133.65
46	58930.44	552.63	2096.27	16032.23	3248.44	31894.30
Cpl.Imp	7739.86	310.05	654.57	9824.85	2130.82	15366.82
Total	273550.95	7641.98	27854.80	134770.49	31718.68	341961.46

Cpl.Imp.= Complementary Imports

CHAPTER 6

EMPIRICAL ANALYSIS OF IMPACT OF LIBERALISATION OF TRADE IN DYNAMIC INPUT-OUTPUT FRAME-WORK

6.1 Introduction

The international trade may not only affect the current structure of production, income, employment, and prices in the domestic economy, but it may affect the nature and level of fixed capital formation in the domestic economy as well. The semi-closed Static Input-Output Trade Model used in this study so far, does not take into account the effects on capital formation and its impact on the economy in the light of liberalisation of trade. The capital formation in the economy is affected by liberalisation of international trade in many ways. The liberalised trade helps in easy availability and in reduced prices of some of the machinery and equipments for establishment of many new ventures and as such induces capital formation. It makes production in some sectors internationally more competitive and thereby induces investment in some more sectors hitherto not considered profitable for investment. On the other hand easy availability of some products at cheaper rates affects the investment in the concerned industries adversely and as such investment may suffer in such industries. Further due to higher emphasis on and incentives for exports, the sectors producing exportables may get boost for investment and those producing non-

tradable goods and services may have to face losses in terms of new investment resulting shift in investment pattern. So there is possibility of both types of effects on domestic investment due to liberalisation of trade. It is therefore important to analyse the effects of liberalisation of Trade on structure of production etc. in future with the help of dynamic Input-Output model. In this study an effort has been made to take into account the effect of imports of capital goods also while using dynamic model rather than taking into account the domestic production of capital goods and the capital -coefficient matrix (based on incremental capital-output ratios of various domestic sectors only). We have incorporated capital-coefficient vector for complementary imports also while using dynamic I-O model. Therefore in this study the semi-closed dynamic I-O model has been developed as described in **chapter 2** (in section 2.8), and used for projection of future structure of production etc. The efforts have been made to estimate the backward linkages and multipliers of output, income, labour and prices for various sectors and the economy as a whole. We shall discuss all of these in that order in comparision with the trend observed in the past, so as to understand the changes expected in the future in the various characteristics of Indian economy.

6.2 Structure of Future Production

Let us first discuss the shares of various sectors in total output as observed during the recent past and as estimated for the year 2000-01. Table 6.1 presents the value of output as

Table 6.1 : The Projected Gross Output during the Eighth and Ninth Plans

(at Constant Prices in Rs.Million)						
S.No.	1991-92	% Distn.	1996-97	% Distn.	2000-01	% Distn.
1	451703.2	7.912364	547081.1	6.891334	546165.0	5.085146
2	34511.66	0.604531	42875.44	0.540082	43611.10	0.406047
3	15774.11	0.276311	20132.46	0.253599	21530.34	0.200461
4	368436.4	6.453802	444430.1	5.598285	451773.7	4.206303
5	245148.1	4.294194	314115.6	3.956773	306130.7	2.850273
6	71456.95	1.251172	67847.30	0.854641	132141.3	1.230320
7	27388.68	0.479760	38411.02	0.483846	37817.23	0.352102
8	38410.71	0.672830	47530.16	0.598715	73499.10	0.684323
9	62233.84	1.090133	103339.6	1.301723	144790.6	1.348093
10	2506.373	0.043903	3169.022	0.039918	4317.196	0.040195
11	15990.57	0.280102	19527.46	0.245978	35526.10	0.330770
12	47771.02	0.836792	62100.15	0.782247	65634.30	0.611097
13	11616.75	0.203487	13761.87	0.173352	14733.63	0.137179
14	213221.0	3.734936	251287.5	3.165355	269440.2	2.508661
15	193125.5	3.382929	260497.3	3.281367	246910.0	2.298890
16	122257.8	2.141558	184994.6	2.330294	195476.6	1.820012
17	13263.36	0.232330	19639.92	0.247395	28724.43	0.267442
18	103672.2	1.815999	153067.2	1.928119	163608.8	1.523303
19	35374.61	0.619647	54631.79	0.688172	94235.23	0.877390
20	45346.14	0.794316	64481.26	0.812241	79231.21	0.737693
21	29034.98	0.508598	76444.99	0.962943	63708.97	0.593171
22	55257.23	0.967926	85305.33	1.074552	91411.60	0.851100
23	15758.91	0.276044	26747.96	0.336931	33778.02	0.314495
24	147955.4	2.591696	183323.9	2.309248	258211.4	2.404113
25	12969.98	0.227191	17772.71	0.223874	36010.99	0.335285
26	60970.43	1.068002	80096.43	1.008938	82913.34	0.771976
27	8025.219	0.140575	10760.21	0.135541	14010.97	0.130451
28	14450.71	0.253129	43616.64	0.549419	75264.30	0.700758
29	172758.6	3.026166	251254.8	3.164943	295067.1	2.747264
30	33666.16	0.589721	50325.02	0.633921	98829.00	0.920161
31	38857.37	0.680654	61092.26	0.769551	107930.9	1.004906
32	171251.4	2.999765	266430.9	3.356110	521363.1	4.854225
33	24171.56	0.423406	33413.55	0.420895	68107.62	0.634125
34	119748.0	2.097595	175946.6	2.216320	480678.6	4.475426
35	100148.7	1.754278	160243.3	2.018513	238759.9	2.223007
36	55002.58	0.963465	72172.70	0.909127	107666.9	1.002447
37	58064.83	1.017106	107139.7	1.349590	283890.2	2.643200
38	28138.42	0.492893	43393.39	0.571800	67410.29	0.627633
39	44711.81	0.783204	120922.4	1.523205	247773.9	2.306934
40	145467.5	2.548115	244404.3	3.078650	368427.9	3.430300
41	59073.19	1.034769	72114.99	0.908400	89067.56	0.829276
42	222406.0	3.895828	334202.9	4.209804	515197.8	4.796822
43	155142.6	2.717591	229221.5	2.887399	308927.6	2.876314
44	357515.0	6.262495	462693.7	5.828344	922369.2	8.587848
45	26430.64	0.462978	37134.51	0.467766	52232.14	0.486314
46	1432640.	25.09517	1977586.	24.91075	2356092.	21.93672
C1.Imp	274334.1	4.805437	409041.7	5.152513	640224.2	5.960897
Total	5708827.		7938682.		10740399	
C1.Imp = Complementary Imports			Exports		802299.0	

observed during the year 1991-92, and as projected for the years 1996-97 and 2000-01 with the help of projected I-O table as provided by the Planning Commission of India and the one prepared with the help of dynamic semi-closed I-O model developed in this study.

Table 6.1 also presents the percentage shares of various sectors over these three periods. These periods provide the comparative picture of three different policy regimes, viz. mild level of liberalisation (upto 1991-92), major trade liberalisation (after 1991-92 upto 1996-97) and the future anticipated scenario assuming that the same policies will continue and get further strengthened in the next few years. From this table we observe that the structure of production is likely to undergo very substantial change in the coming years. We observe that the share of agricultural sectors except that of the forestry sector is likely to go down successively in the future. The shares of mining sectors, woollen textiles, wood , petroleum and coal tar products, synthetic fibre and resin, cement , all metallic and non-metallic mineral products, machinery and equipments including transport equipment among the manufacturing sectors and other transport , construction and communication services are likely to increase significantly. The shares of the remaining sectors are likely to go down. We observe that while during the period 1991-92 to 1996-97 the shares of fishing, all the textile sectors and agro-based processing sectors increased but in the projected structure these sectors are likely to lose in share. On the other hand the shares of coal mining, metallic and non-metallic minerals, non-ferrous metals, rail equipments

and construction sectors came down during the earlier period , while the trend is likely to reverse for these sectors in the future. It might be due to the decreased/increased investment activity in these sectors in the recent past. Here we observe that most of the export-oriented sectors and modern machinery-based industries , construction and communication services are likely to be more important in the future. It is disheartening to note that the shares of most of the agricultural sectors and agro-based industries are likely to go down in future. It is due to the reduced investment in agriculture and competition faced by the soft agro-based food products sector due to imported goods. On the other hand the less labour-intensive and more capital-intensive modern manufacturing sectors are likely to get higher emphasis in the future.

We also observe from this table that the ratio of complementary imports to the gross output at constant prices is likely to grow at faster rate in the future. It is likely to be about 6 % of Gross output during 2000-01 as against about 4.8 % during 1991-92 at comparable prices. The annual growth rate of complementary imports is likely to be about 12 % during the next 5 years. Further the competitive imports are also likely to increase due to higher emphasis on the sectors like tourism, hotels and restaurants and the soft sectors as a result of higher foreign investment likely in future, but since the competitive imports are assumed to behave as exogenous variable, the same have not been projected in this study. The competitive imports are also likely to grow faster in the next few years because of higher growth rate of income (of course depending upon the condition of availability of such imported items) and profits in

the various sectors during the next few years. It is therefore felt that the growth in imports is likely to be much higher in future years seeing the trend in the growth in competitive imports in the recent past. With the help of this model we have also estimated the annual rate of growth of Total output at constant prices, which is likely to be around 7.85 % in the next few years on an average.

6.2.1 Growth of Output

From the Appendix Table 6A.1 we observe that among the sectors which are likely to have negative rate of annual growth (possibly due to lack of adequate level of capital formation or demand) in the next few years are foodgrains, animal husbandry, fishing, cotton textiles, and leather products sectors. The sectors which are likely to have higher annual growth of output (above 10 %) in value terms at constant prices are forestry, coal mining, non-metallic minerals, wood , coal tar products, synthetic fibre and resin, cement, non-metallic mineral products, all metal products, machinery , transport and other equipment, other manufacturing sectors, other transport and construction services. The other agricultural sectors , agro-based industries excluding woollen textiles , and fertiliser sectors are likely to have very low rates of growth of output. The remaining sectors are likely to have moderate rates of growth (between 2 to 8 percent) in the next few years.

6.2.2 Output Linkages in Future

The backward output linkages (BOLs) of the various sectors during these periods are presented in Table 6.2. From this table we observe that the output linkages are likely to increase in 23 sectors during the period 1991-92 to 1996-97. Most of these sectors are from the agricultural, agro-based sectors and a few are from metal based machiney and eqiuipments manufacturing and other transport, construction and communication services. However during the next period , i.e. from 1996-97 to 2000-01 we observe that the BOLs are likely to increase in 14 sectors only. These sectors are agricultural sectors except forestry and fishing, mining sectors other than non-metallic type, sugar, coal tar products, cement, railway transport, electricity and communication service sectors. The BOLs for the remaining 32 sectors are likely to go down. Thus we observe that the output linkages are likely to increase in distant future in mostly such sectors which are providing the agricultural or mineral raw materials or the basic infrastructural facilities like transport, electricity and communication services. This indicates that the production may become more concentrated in lesser number of sectors in future. Further we observe that the output linkages of exports for the domestic sectors are also likely to come down significantly after 1996-97. It indicates that the exports may be more of such products which are more dependent on imports and may not help in inducing significant additional output in the economy. .

**Table 6.2 : Backward Output Linkages
in the Future Years**

Sec No	1991-92	1996-97	2000-01
1	0.938306	0.975886	1.073721
2	0.864622	0.902051	0.990294
3	0.655049	0.687415	0.763507
4	0.660360	0.653428	0.763572
5	0.911487	0.922628	0.939082
6	0.569426	0.556678	0.431483
7	0.625504	0.685624	0.507214
8	0.771014	0.819833	3.235093
9	0.610195	0.646408	0.715204
10	0.736926	0.775840	0.971082
11	0.640929	0.743538	0.604685
12	1.075872	1.077323	1.113303
13	0.981850	1.003855	0.889746
14	1.273119	1.315296	1.193288
15	1.227779	1.252994	1.066131
16	1.086135	1.024626	0.808285
17	1.105617	1.019786	0.812257
18	1.103688	1.095375	0.865808
19	0.908189	0.902841	0.671023
20	1.135634	1.124086	0.950353
21	1.270431	1.289881	1.007060
22	0.969543	0.804996	0.649480
23	1.211837	1.005809	0.820778
24	1.211190	1.319660	1.136460
25	1.212803	1.174798	1.547046
26	1.121234	1.096828	0.970267
27	1.097285	1.089989	0.844349
28	1.366561	0.924926	0.866506
29	1.079797	1.029575	0.856495
30	0.905493	0.888593	1.557551
31	1.042807	1.024924	0.960581
32	1.328654	1.412250	1.364074
33	1.287927	1.346673	1.149603
34	1.201445	1.302747	1.100272
35	1.079733	1.077553	0.821875
36	0.621150	0.612985	0.578952
37	1.154714	1.223981	1.014524
38	1.192218	1.156052	0.944556
39	0.987650	1.177083	0.885732
40	0.884199	0.879932	0.692602
41	1.276735	1.274380	1.653008
42	1.049163	1.080617	0.967704
43	1.039916	1.020192	1.110027
44	1.188910	1.196955	1.080750
45	0.730464	0.795628	1.599912
46	0.671335	0.661695	0.636906
Exports	0.935080	0.945762	0.817777

6.3 Structure of Value Added

Besides the structure of production, it is important to know the structure of value added likely to be generated in the future in the domestic economy. The Table 6.3 presents the shares of various sectors in Gross Value Added (GVA) during the year 2000-01 on the basis of the dynamic I-O model as developed in this study. From this table we observe that the shares of most of the agricultural sectors and agro-based industries are likely to go down in future, while for most of the other manufacturing sectors, mining, service sectors except the other services are likely to go up. Here it is important to note that not only the shares of agricultural and agro-based sectors in the GVA are likely to go down but those of the sectors providing essential input to agriculture ,e.g. fertilisers and pesticides sectors are also likely to follow the same trend, it shows that the potential of growth in agriculture is likely to suffer in a major way, which may not be good for the overall future prospects of the Indian economy.

In case of construction sector, while the trend is for growth in share in GVA in next few years, during the later period however, the same is likely to go down. With regard to the other services sector which includes the public services, defence and social services besides trade, hotels & restaurants etc., the share is likely to come down in the next few years(i.e. upto 1996-97), but it may pick up a few years later (by say 2000-01 A.D.). Overall , the growth in GVA is likely to be around 5.7% per annum in the next few years, but it may go up significantly

Table 6.3 : Anticipated Structure of Gross Value Added in the Future
(Gross Value Added in Rs. Million)

Sec No.	GVA in 1991-92	Percentage Distn.	GVA in 1996-97	Percentage Distn.	GVA in 2000-01	Percentage Distn.
1	288986.4	9.654475	328232.8	8.308268	327683.1	6.437957
2	21619.50	0.722265	25471.23	0.644730	25908.27	0.509017
3	12347.63	0.412510	14912.61	0.377469	15948.05	0.313329
4	279078.0	9.323454	330250.5	8.359341	335707.5	6.595611
5	104885.7	3.504029	123426.0	3.124175	120288.5	2.363296
6	66110.78	2.208632	62473.31	1.581331	121674.8	2.390532
7	23136.84	0.772956	29477.14	0.746129	29021.46	0.570181
8	27939.18	0.933393	34195.68	0.865565	52879.10	1.038910
9	52140.00	1.741896	81773.45	2.069859	114573.9	2.251021
10	2121.674	0.070881	2593.784	0.065654	3533.543	0.069423
11	13282.92	0.443756	15420.99	0.390338	28055.25	0.551198
12	8926.195	0.298206	9766.274	0.247205	10322.07	0.202796
13	3056.371	0.102107	3214.466	0.081364	3441.449	0.067613
14	37295.71	1.245977	41072.10	1.039622	44039.09	0.865231
15	74650.44	2.493926	96907.45	2.452933	91852.84	1.804623
16	31301.08	1.045708	41650.30	1.054257	44010.24	0.864664
17	3629.393	0.121250	4350.591	0.110122	6362.970	0.125012
18	59646.59	1.992676	84048.23	2.127438	89836.54	1.765009
19	14129.98	0.472055	21560.91	0.545752	37190.75	0.730682
20	15661.43	0.523217	21788.61	0.551516	26772.72	0.526000
21	8862.907	0.296092	23366.64	0.591459	19473.67	0.382597
22	16697.60	0.557834	25949.33	0.656832	27806.82	0.546317
23	4615.116	0.154182	6338.292	0.160435	8004.162	0.157256
24	7883.616	0.263376	8835.561	0.223646	12444.87	0.244503
25	1014.652	0.033897	1132.006	0.028653	2293.667	0.045063
26	14002.25	0.467787	17768.57	0.449760	18393.48	0.361374
27	2531.299	0.084565	3008.894	0.076161	3917.908	0.076974
28	3720.316	0.124288	10185.25	0.257810	17575.54	0.345304
29	54370.80	1.816422	80041.99	2.026032	93999.23	1.846793
30	12635.82	0.422138	19319.10	0.489007	37939.12	0.745386
31	19953.20	0.666597	31090.76	0.766973	54927.65	1.079158
32	39222.03	1.310331	60122.40	1.521825	117650.0	2.311457
33	3869.460	0.129271	4849.398	0.122748	9884.642	0.194202
34	35787.89	1.195604	48408.88	1.225331	132250.9	2.598321
35	33255.38	1.110997	46841.92	1.185668	69793.66	1.371229
36	25519.02	0.852541	33228.86	0.841092	49570.65	0.973909
37	18067.00	0.603583	32256.82	0.816488	85471.57	1.679251
38	12471.56	0.416650	18860.24	0.477392	28007.91	0.550268
39	16596.27	0.554449	30096.05	0.761794	61667.75	1.211580
40	77240.03	2.580439	121901.8	3.085594	183761.2	3.610338
41	24642.16	0.823246	28986.21	0.733702	35800.20	0.703362
42	100670.5	3.363207	145539.2	3.683907	224359.2	4.407962
43	69818.10	2.332487	104498.9	2.645088	140835.8	2.766986
44	120858.6	4.037652	153154.8	3.876672	305310.3	5.998404
45	21032.99	0.702671	27628.69	0.699340	38861.58	0.763509
46	1108005.	37.01630	1494679.	37.83350	1780757.	34.98636
Total	2993290.	100	3950676.	100	5089862.	100

in the subsequent years to around 6.54% (during 1996-97 to 2000-01) at constant prices .

When we observe the annual rates of growth of GVA during the next few years for the various sectors from the appendix Table 6A.2, we find that foodgrains, animal husbandry, fishing, cotton textiles, and leather products sectors are likely to have negative growth in GVA at constant prices. The other sectors in which the rates of growth of GVA are likely to be very low (less than 2 %) are all the other agricultural sectors except forestry, all agro-based industries except cotton and woollen textiles, rubber products, and fertilisers sectors. The sectors which are likely to have good growth rates (about 7 % or more) in GVA are forestry, all mining sectors, woollen textiles, wood , petroleum and coal tar products, synthetic fibre and resin, cement, all metallic , non-metallic mineral products, machinery, equipment, other manufacturing sectors, other transport, construction and communication service sectors. All the other sectors are likely to have moderate rates of growth in GVA during the next few years.

6.4 Income Linkages in Future

The trade liberalisation has created fear in minds of the workers and some of the economists that the income linkages in the economy may go down with more liberalisation. It is felt that with higher level of imports, the income linkages of the various sectors may go down during the next few years. In this section we shall discuss the comparative position of Backward

Income Linkages (BILs) of various sectors and exports for the three periods covering the recent past and the instant future as considered above. Table 6.4 provides the estimates of BILs of various sectors for the three periods. From this table we observe that during the period 1991-92 to 1996-97, 30 sectors had above average level of BILs and except for ten sectors the BILs are expected to increase during this period. The BIL of exports also are likely to increase during this period albeit marginally. The sectors for which there may be decline in BILs are textile sectors, plastic and rubber products, pesticides, synthetic fibre and resin, electric machinery and electronic & communication equipment manufacturing sectors. However during the next period i.e. from 1996-97 to 2000-01, we find that in 34 sectors the BILs are likely to decrease and only for foodgrains, fibre crops, coal mining, iron ore, sugar, coal tar products, synthetic fibre & resin, cement, iron and steel, rail transport service, electricity and communication sectors the BILs are likely to increase during the same period. The BILs due of the exports also are likely to decrease significantly. Thus we observe that there may be very significant decline in income linkages of many sectors in the future.

6.5 Labour Linkages in future

The labour linkages in the Indian economy have been going down over the years and particularly during the period after the liberalisation of trade began since 1984-85 . In this section we shall analyse the position with regard to labour intensity of the economy as a whole and in various sectors

**Table 6.4 : Backward Income Linkages
in the Future Years**

Sector Number	1991-92	1996-97	2000-01
1	1.132381	1.183346	1.206833
2	1.009400	1.057903	1.086902
3	0.991355	1.020938	0.980273
4	0.975349	1.003077	0.991851
5	1.005451	1.048366	1.037421
6	1.061649	1.095064	0.805124
7	1.029682	1.032368	0.755256
8	1.039341	1.108394	3.295295
9	1.008688	1.022868	0.954461
10	1.129203	1.190441	1.221660
11	1.023977	1.125499	0.871399
12	0.986193	1.005023	1.056045
13	0.891379	0.917681	0.840446
14	1.101075	1.153384	1.091426
15	1.176385	1.158096	1.013628
16	0.787747	0.711363	0.610807
17	0.888905	0.718385	0.624326
18	1.263227	1.206507	0.958110
19	1.084927	1.122758	0.837953
20	1.031475	1.060202	0.921038
21	1.126420	1.170668	0.948983
22	0.791598	0.645226	0.552763
23	0.955947	0.715618	0.640283
24	0.939938	1.132572	1.018924
25	0.895784	0.895115	1.342016
26	0.850080	0.885074	0.831932
27	0.948410	0.932884	0.756301
28	1.096160	0.676123	0.707385
29	0.915835	0.926503	0.798816
30	0.895158	0.895220	1.532756
31	1.127392	1.134545	1.040981
32	1.041071	1.087198	1.147669
33	0.983586	1.047591	0.960179
34	0.983089	1.036249	0.935527
35	0.902845	0.820466	0.667025
36	0.607309	0.626828	0.574581
37	0.931995	0.966568	0.855285
38	1.123677	1.13269	0.944879
39	0.858732	0.840937	0.680380
40	0.941779	0.949005	0.752655
41	1.211915	1.227683	1.601391
42	1.011877	1.028594	0.934686
43	1.048628	1.046377	1.123328
44	1.068361	1.065654	1.000747
45	1.073744	1.090669	1.704516
46	1.019023	1.045724	0.897930
Exports	1.031833	1.035954	0.887804

during the next few years after 1996-97 till 2000-01. We have projected the Labour-Output Coefficients (LOCs) for the various sectors in the economy with the help of the projected output for the year 2000-01 and the projected employment by sector assuming that the trend in growth of labour employment in various sectors will continue as obtained during 1989-90 to 1991-92. Thus we obtained LOCs for the years 1996-97 and 2000-01. Table 6.5 presents the LOCs for the three periods 1991-92, 1996-97 and 2000-01 for the various sectors. These estimates provide the comparative position of direct labour intensity during the recent past and the next few years. Let us examine the position from this table as follows.

From this table we observe that the LOCs were estimated to decrease for 37 sectors during 1991-92 to 1996-97 except the forestry, crude petroleum, non-metallic minerals, sugar, gur & khandsari , textile products, fertilisers, pesticides and construction sectors (these are the nine sectors in which the LOCs are likely to increase during this period). During the period 1996-97 to 2000-01 however we observe that the LOCs are likely to increase in 12 sectors (as against 9 during the previous 5 years). The sectors in which the LOCs are likely to increase are other crops, animal husbandry, cotton textiles, paper, leather and rubber products in addition to the sectors which showed positive trend in LOC during the earlier period. But in forestry, non-metallic minerals and construction sectors the LOCs are likely to go down comparatively. We also observe that there are 7 sectors in which the LOCs were estimated to come down very substantially during 1991-92 to 1996-97 viz. foodgrains, fibre crops, tea & coffee, fishing, wood , leather and non-

Table 6.5 : Labour Output Coefficient during various years and
change in the Future (in Number of Workers per Rs.one Million

Worth of the Gross Output Produced by Various Sectors)					
Sector	Labour-Output Coefficient for			Growth in LOC during	
Number	1991-92	1996-97	2000-01	1991-96	1996-2000
1	315.284	254.830	250.943	-60.4542	-3.88652
2	36.0965	22.5904	18.1592	-13.5060	-4.43119
3	60.1489	37.8999	29.7697	-22.2489	-8.13024
4	19.6770	16.8239	16.9642	-2.85314	0.140379
5	48.1312	40.2291	43.6057	-7.90207	3.376576
6	20.5820	30.7499	20.8840	10.16793	-9.86595
7	26.4460	15.3949	13.2942	-11.0511	-2.10064
8	17.2293	15.2263	10.5768	-2.00304	-4.64946
9	0.60237	0.61836	0.67618	0.015986	0.057817
10	13.1133	5.48153	2.41590	-7.63183	-3.06563
11	99.6354	103.252	68.5199	3.617450	-34.7330
12	4.90584	4.99153	5.90683	0.085690	0.915297
13	27.9980	30.9642	35.8996	2.966256	4.935324
14	25.3091	20.9458	19.1485	-4.36327	-1.79729
15	19.1388	13.9432	14.5064	-5.19553	0.563142
16	2.68039	1.27034	0.92145	-1.41004	-0.34889
17	13.1023	10.5927	8.36401	-2.50958	-2.22875
18	60.2745	61.7012	80.3290	1.426633	18.62786
19	103.069	72.9429	45.4047	-30.1266	-27.5382
20	21.1071	19.5326	19.8005	-1.57455	0.267898
21	15.5089	4.87565	5.02903	-10.6332	0.153375
22	3.34256	2.89960	3.41815	-0.44295	0.518544
23	17.7712	13.5893	13.2571	-4.18189	-0.33217
24	0.34844	0.32862	0.26427	-0.01982	-0.06434
25	0.89429	0.45097	0.16560	-0.44331	-0.28537
26	2.81789	3.55873	5.15436	0.740834	1.595633
27	9.64339	11.9369	13.7489	2.293596	1.812000
28	4.66761	2.20230	1.69347	-2.46530	-0.50883
29	3.67475	2.58325	2.23899	-1.09149	-0.34426
30	4.78090	3.30600	1.72865	-1.47490	-1.57734
31	60.3205	36.9656	20.3102	-23.3549	-16.6554
32	5.14704	3.62971	1.99769	-1.51733	-1.63202
33	5.00390	3.30395	1.50672	-1.69995	-1.79722
34	8.32581	6.19294	2.43382	-2.13286	-3.75911
35	6.83128	5.72085	4.85238	-1.11042	-0.86847
36	1.81598	1.35376	0.89159	-0.46222	-0.46216
37	6.79415	5.09029	2.48919	-1.70386	-2.60110
38	7.63272	5.78784	4.57939	-1.84487	-1.20845
39	3.12243	1.35815	0.75480	-1.76427	-0.60335
40	17.9705	12.7211	9.69453	-5.24944	-3.02658
41	16.7593	11.7425	8.39033	-5.01682	-3.35219
42	25.7402	18.3682	12.5996	-7.37196	-5.76857
43	5.21291	3.69040	2.83849	-1.52250	-0.85191
44	38.9929	42.9924	28.6618	3.999460	-14.3305
45	17.3713	12.1256	8.48747	-5.24567	-3.63817
46	33.1145	25.9044	23.1206	-7.21009	-2.78376

metallic mineral products sectors. During 1996-97 to 2000-01 also some sectors are likely to show major decline in LOCs, e.g. tea & coffee, forestry, non-metallic minerals, wood and non-metallic mineral products, other transport service and construction sectors. Thus we observe that the direct labour intensity with respect to the output ,in the Indian economy is likely to increase in some of the agricultural sectors, agro-based industries and sectors providing basic agricultural inputs e.g. fertilisers and pesticides only and in most of the non-agro-based industries and tertiary sectors it is likely to go down. It is worrysome to note that in some of the labour-intensive sectors e.g. tea & coffee, non-metallic minerals and their products,wood products, and construction sectors the labour intensity is likely to go down very substantially in future. But the above analysis is on the basis of direct labour coefficients only. When we analyse the direct,indirect and induced labour linkages the position may be quite different as provided in Table 6.6.

When we study the direct, indirect and induced Backward Labour Multipliers (BLMs) for the three concerned periods as above we observe that the BLMs decreased in most of the sectors except non-metallic minerals sector before 1996-97. But after 1996-97 we find that the BLMs are likely to increase very substantially in most of the sectors. Only forestry, non-metallic minerals, their products, wood products and construction sectors are likely to have decreasing trend in BLMs during the next 5 years. At the overall economy level the BLM for the whole economy is likely to come down during 1991-92 to 1996-97, while it is

**Table 6.6 : Backward Labour Multipliers
in the Future**

Sector Number	1991-92	1996-97	2000-01
1	36.59392	29.83496	31.42819
2	5.056471	3.666546	5.128041
3	6.823405	4.725321	5.093799
4	2.657889	2.319657	3.958381
5	7.883150	6.883498	8.722162
6	2.319922	3.288547	2.633069
7	3.247578	1.946715	2.014136
8	2.582507	2.347462	13.95801
9	0.522035	0.472887	1.566175
10	1.926246	1.117491	2.648857
11	10.40038	10.90688	7.840270
12	3.377415	2.918303	4.766355
13	4.961049	4.886051	6.444317
14	7.407957	6.084089	7.088898
15	5.108872	3.757544	4.741160
16	2.006172	1.332887	1.676844
17	3.889757	2.716570	3.022355
18	9.274598	8.381449	10.89627
19	12.52873	10.05691	6.877599
20	4.847918	4.242745	5.057859
21	5.132078	3.004478	3.583790
22	1.932685	1.107497	1.627172
23	4.026972	2.486940	3.046927
24	2.156242	1.920263	2.923558
25	2.658723	2.247342	5.407831
26	2.281427	2.124034	3.207669
27	3.346117	3.098529	3.714640
28	3.339380	1.326219	2.318839
29	2.754999	2.096992	2.707435
30	3.313264	2.281898	6.107229
31	8.419955	5.412429	4.724070
32	3.506658	2.797607	4.161651
33	4.179136	3.454635	3.782100
34	3.298313	2.629658	2.978995
35	2.784308	1.804136	2.039618
36	0.450854	0.374585	0.789910
37	2.791010	2.173538	2.538800
38	2.974131	2.458249	2.993913
39	1.862054	1.333996	1.607312
40	3.216154	2.556706	2.616291
41	3.570804	2.528247	5.033073
42	4.409878	3.198011	3.506400
43	2.002543	1.440761	3.034940
44	7.158370	6.833846	6.103398
45	2.585203	1.824963	6.042379
46	4.301083	3.395934	4.093247
Exports	4.875332	3.822306	4.653319
Total	226.7436	181.6203	230.9072

likely to increase and reach almost the same level during 2000-01, as it was during 1991-92. For the exports also while the trend in BLM was towards decline during 1991-92 to 1996-97, the same is likely to increase during the next few years, although it will still be less than that obtained during 1991-92. Thus we observe that for overall compound labour intensity the trend is likely to be of marked recovery of BLMs during the next few years.

6.6 Import Intensity in Future

It is important to have a view of the likely import intensity of the domestic economy in the future. It may give an idea of the import dependence of the production process in the economy during the next five year plan. For an analysis of the same the Backward Import linkages (BIMLs) of the various sectors for complementary imports have been estimated with the help of the dynamic semi-closed I-O model as developed in this study. The estimates of the same as denoted by BIMLs are presented in Table 6.7 as follows. From this table we observe that the import intensity increased during 1991-92 to 1996-97 in 28 sectors while came down in the remaining 18 sectors. The import intensity of exports was expected to come down marginally during that period. However during 1996-97 to 2000-01 it is expected that import intensity of 25 sectors will go up and for the remaining 21 sectors it will come down . For exports also the same is like to come down very sharply. While there are 15 sectors which are likely to show regular trend towards growth in import intensity e.g. fibre crops, tea & coffee, other crops, forestry, crude

Table 6.7 : Import Intensity in the Future Years

Sec No.	1991-92	1996-97	2000-01
1	0.518361	0.480025	0.711562
2	0.537099	0.538987	0.680467
3	0.152698	0.197493	0.425846
4	0.202352	0.203442	0.459058
5	0.155396	0.163463	0.478704
6	0.078932	0.072497	0.108175
7	0.151843	0.326547	0.207901
8	0.294082	0.350074	7.060550
9	0.141403	0.170319	0.383531
10	0.377888	0.339638	0.643022
11	0.194286	0.324864	0.293872
12	0.281417	0.374978	0.603660
13	0.338855	0.469190	0.483716
14	0.473595	0.624298	0.669393
15	0.482896	0.508648	0.560808
16	0.333051	0.502562	0.390768
17	0.290210	0.239269	0.326905
18	0.313469	0.340721	0.356802
19	0.117707	0.112665	0.148047
20	0.562977	0.722985	0.673033
21	0.530994	0.536547	0.448733
22	0.571161	0.452506	0.372094
23	0.622947	0.419564	0.490190
24	3.877215	2.444744	1.337886
25	0.501484	0.438955	2.021635
26	1.809402	1.404293	0.929766
27	0.836152	1.098701	0.636461
28	0.932131	0.467471	0.816734
29	1.232253	1.145326	0.730463
30	0.262105	1.239035	3.314376
31	2.022998	1.703352	1.292967
32	1.141457	1.472898	1.352682
33	1.814919	1.662393	1.095189
34	1.567844	1.269540	0.930928
35	1.309272	1.025500	0.617126
36	0.118874	0.133518	0.210581
37	1.016349	1.186119	0.818502
38	0.925336	2.187247	1.174785
39	0.978898	0.602524	0.423623
40	0.819206	2.052919	1.021714
41	0.871277	0.851372	1.168254
42	1.549818	1.195660	0.792497
43	0.442983	0.467812	1.195582
44	1.480424	1.440369	1.169388
45	0.214157	0.189400	1.149271
46	0.220288	0.188362	0.313724
Exports		13.33151	12.66118
			5.509007

petroleum, sugar, gur and khandsari, other food products, cotton textiles, textile products, wood products, cement, railway equipments and electricity sectors (most of these are agricultural, agro-based industries). The sectors which are likely to show regular trend towards declining import intensity are rubber products, petroleum products, fertilisers, other chemicals, non-metallic mineral products, non-ferrous metals, machinery sectors, electronic and communication equipments, other transport equipments and construction sectors. It indicates that the metal based machinery, equipment, motor vehicles, other transport equipments, service sectors except railway and electricity sectors are likely to be less import intensive in future. The exports are also expected to be less import intensive in the future years. It may give useful hints that if we have to reduce imports we have to reassess the technology vis-a-vis the import-intensity of the primary sectors and agro-based industries. In most of the organised sectors dealing with modern manufacturing, the import intensity is likely to come down , but it is already quite high. So sincere efforts are needed to ensure appropriate and efficient use of imports in various sectors. It will be necessary to contain the trade-balance in the domestic economy.

6.7 Export Capability in Future

The export capability during the future years has been estimated with the help of the forward multipliers of the various sectors and the complementary imports towards exports for the above three periods. Table 6.8 presents these estimates for the

years 1991-92, 1996-97 and 2000-01. from this table we observe that the overall export capability of the economy is likely to go down marginally in future. However we observe that the C.V. of the exports over various sectors is likely to go down indicating that the export capability of various sectors will be more evenly spread over the various sectors in future. It shows that dependency on a few sectors for the exports will come down in future. Further we observe that the export intensity of agricultural sectors except tea & coffee is likely to increase in future. Besides these , the overall export capability of coal mining, cotton , silk and synthetic textiles, wood , leather and rubber products, fertilisers, pesticides, cement , non-metallic mineral products ,railway transport equipments and construction sectors is also likely to increase in future, while that of minearls other than coal, textile products and that of most of the modern metal and machinery, transport equipment based sectors the same is likely to go down in future. It seems to be clear that the export capability of most of the traditional small scale sectors is likely to increase while that of the modern and organised sectors is likely to go down. It is established that there is a clear dichotomy between import-intensive and export-intensive sectors in the Indian economy and the same tendency is likely to continue in future as well.

6.8 Linkages of various Sectors in I-O System with endogenous consumption

6.8.1 Introduction

The direct, indirect and induced linkages of various production sectors, the foreign trade and the income generated in the process of production in various sectors, distributed to different income groups accrue to different sectors and the primary input sectors in various ways. Since the consumption habits ,elasticities and opportunities are different for the different income groups and the proportions of value added accruing to the different income groups from various sectors of production are different, the growth in production in the various sectors induce different trends of backward and forward linkages for production in various sectors. Such compound linkages can be estimated in an extended endogenous Input-Output model endogenising the net value added and the consumption of the income-groups viz., the wage earners (low income group), earners of salaries or the regular employees (i.e. the middle income group) and the earners of profit or turnover in the form of rents , interest besides profits by way of dividends (or the high income group) as used in this study. The anticipated trends in these in alternative situations with regard to changes in policies in the field of international trade are analysed in the next paragraphs.

The output , income and labour linkages and the effect on prices have been estimated for the year 2000-01 in three alternative situations as follows.

(a) if the imports grow as per the growth envisaged in the VIIIth Five Year Plan;

(b) if exports grow in the primary sectors as envisaged in the eighth plan ; and

(c) if both of the above situations occur simultaneously.

This has been done to analyse the impact of liberalisation of trade whether it is likely to affect the economy adversely ,if either the imports increase or the exports increase particularly those of primary sectors which provide the basic raw materials to the manufacturing sectors in the domestic economy.

6.8.2 Output Linkages

The output linkages of the sectors which provide inputs to the concerned sectors in the upstream and the downstream production sectors are estimated as Backward Output Linkages (BOLs) and Forward Output Linkages (FOLs) respectively.

6.8.2.1 Backward Output Linkages

These linkages have been presented in Table 6.9 . From this table we observe that in case the complementary imports grow as envisaged the BOLs are likely to increase in 10 sectors belonging to the machinery and other transport, other chemicals

**Table 6.9 : Backward Output Linkages of various Sectors
and Exports With Alternative Trade Scenario**

Sector Number	Usual Trade	Growth in Imports	Growth in Exports	Growth in Both
1	1.124766	1.119005	1.124762	1.119005
2	1.000345	0.997845	1.000343	0.997846
3	1.051256	1.043907	1.051251	1.043908
4	0.974057	0.968146	0.974054	0.968146
5	1.094633	1.086310	1.094628	1.086311
6	1.049867	1.041604	1.049862	1.041604
7	1.061963	1.053401	1.061959	1.053401
8	0.991151	0.985827	0.991149	0.985827
9	1.044433	1.036672	1.044429	1.036672
10	0.993888	0.986538	0.993887	0.986538
11	0.995298	0.988081	0.995295	0.988081
12	1.070829	1.063172	1.070825	1.063172
13	1.056178	1.048325	1.056175	1.048325
14	1.005060	0.998263	1.005056	0.998263
15	1.171998	1.165128	1.171994	1.165128
16	0.764322	0.758537	0.764319	0.758537
17	0.974619	0.967231	0.974615	0.967231
18	1.004585	0.997216	1.004581	0.997217
19	1.087104	1.077913	1.087099	1.077913
20	1.039000	1.034244	1.038997	1.034244
21	1.241699	1.233539	1.241695	1.233539
22	0.854009	0.850753	0.854007	0.850753
23	0.883966	0.879883	0.883964	0.879883
24	0.981732	0.977246	0.981758	0.977245
25	1.120014	1.112922	1.120011	1.112922
26	0.727827	0.753521	0.727831	0.753521
27	0.815103	0.815014	0.815101	0.815014
28	0.812418	0.809274	0.812416	0.809274
29	0.844772	0.853161	0.844773	0.853161
30	0.772747	0.766938	0.772744	0.766938
31	1.055820	1.094674	1.055825	1.094673
32	1.103884	1.109253	1.103887	1.109253
33	1.392264	1.485219	1.392273	1.485218
34	1.018369	1.020621	1.018373	1.020621
35	0.926515	0.958649	0.926518	0.958648
36	0.709041	0.708321	0.709040	0.708321
37	0.957900	0.966185	0.957903	0.966185
38	1.067310	1.063646	1.067313	1.063646
39	0.822134	0.823931	0.822132	0.823931
40	0.851267	0.871856	0.851268	0.871856
41	1.074319	1.069731	1.074318	1.069731
42	0.997283	0.991679	0.997284	0.991679
43	1.006114	1.000300	1.006111	1.000300
44	1.066893	1.064396	1.066893	1.064396
45	1.093289	1.085073	1.093285	1.085073
46	1.028796	1.021304	1.028792	1.021304
Exports	1.035839	1.034204	1.035892	1.034200
Wages	1.081238	1.073530	1.081234	1.073530
Salaries	1.060177	1.052805	1.060173	1.052805
Frofits	1.041883	1.034985	1.041879	1.034985

sectors, while in rest of the sectors the BOL decline as compared to the situation obtaining in the usual trade conditions. In this case the BOL due to the exports also decrease and the BOL due to the income received by all the sections of people also decrease. When the exports in primary products are proposed to increase as envisaged then the BOLs are positively affected in 12 sectors and most of these sectors are the same as in case of the growth in complementary imports except the fertiliser and petroleum products. Further the BOL due to the exports also marginally increase in this case, while the BOL due to all the other sectors as well as due to the income generated by all the three groups of the people also go down comparatively. When both the conditions are applied simultaneously then we find that only 10 sectors are positively affected in terms of BOL these are Fertilisers, other chemicals, non-metallic mineral products, iron & steel, non-ferrous metals, other transport equipments, electronic and communication equipments and the other manufacturing sectors. All the service sectors and the primary sectors lose in terms of the BOLs. The BOL due to the exports as well as the income generated to all the sections are also adversely affected in case of growth in foreign trade.

6.8.2.2 Forward Output Linkages

Let us also study the situation obtaining in the direct, indirect and induced forward output linkages of various production sectors and the primary inputs under the above conditions. The Forward Output Linkages (FOLs), indicate the direct, indirect and induced stimulus to production in the various

downline production sectors and the income generation for the different income groups receiving incomes in lieu of primary input labour, management services, house property, finances etc. and using inputs from the concerned sectors due to a unit increase in the production in the concerned sectors. Table 6.10 presents the data on FOLs for the year 2000-01 under different conditions about the growth in trade in future. From this table we observe that in case of growth in complementary imports as envisaged in the Eighth Five Year Plan (FYP), the FOLs are positively affected compared to the usual trade position in only six sectors viz. the coal, crude and metallic mining, sugar, coal tar products and iron & steel. In this case however the FOL due to the income received by the wages and salaries groups will increase. But the FOL due to the complementary imports will go down i.e. the efficacy of complementary imports in inducing additional production in down line production sectors will decline. In case the primary goods' exports grow, the FOL due to only 3 sectors improve viz. the other crops, fishing and the fertiliser sector, while all the other sectors lose in terms of FOLs. In this situation the FOL due to the income received by all the sections of people also decrease as a result of growth in exports of primary articles.

In case both the above conditions are applied simultaneously then five sectors are positively affected ,these are mining sectors except the non metallic mining, coal tar products and iron & steel. Again in this situation the FOLs due to the complementary imports show decline and the FOLs due to the income received by the two lower income groups increase while the same due to the income of the highest class decrease. Further we

**Table 6.10 : Forward Output Linkages of Various Sectors
and Complementay Imports With Alernative Trade Scenario**

Sector Number	With Usual Trade	Growth in Imports	Growth in Exports	Growth in Both
1	1.275516	1.272336	1.275471	1.274063
2	1.363742	1.351175	1.363681	1.352995
3	1.332969	1.322129	1.341663	1.332290
4	1.305836	1.299247	1.307371	1.302561
5	1.231356	1.226427	1.231214	1.228021
6	1.078777	1.074464	1.078245	1.075467
7	1.200672	1.192780	1.212352	1.205537
8	1.167503	1.174149	1.166729	1.174390
9	1.372575	2.027047	1.371892	2.027863
10	0.803548	0.836282	0.802880	0.836088
11	0.720053	0.653974	0.719427	0.643266
12	1.286212	1.282958	1.285649	1.284184
13	1.375432	1.368459	1.374724	1.369735
14	1.270363	1.265349	1.269808	1.266528
15	1.267524	1.259482	1.266915	1.260587
16	1.187653	1.181267	1.187065	1.182353
17	1.292271	1.285291	1.291654	1.286452
18	1.000938	0.985676	1.000383	0.986137
19	0.664554	0.656978	0.664068	0.657452
20	1.129834	1.107409	1.129116	1.108283
21	1.082114	1.062968	1.081462	1.063278
22	0.879236	0.868866	0.878686	0.869434
23	0.885867	0.871467	0.885330	0.872015
24	1.263225	1.202440	1.262697	1.202870
25	0.688790	0.723274	0.688199	0.723573
26	1.373276	1.325783	1.373550	1.328011
27	1.346187	1.311308	1.346378	1.313394
28	0.832664	0.823559	0.832102	0.824241
29	1.216519	1.175494	1.215872	1.176202
30	0.535266	0.534336	0.534805	0.534729
31	0.883295	0.867888	0.882699	0.868007
32	0.584973	0.727551	0.584459	0.727672
33	0.803888	0.496212	0.803214	0.447494
34	0.459290	0.458452	0.458970	0.458685
35	0.429638	0.419580	0.429272	0.419756
36	0.764363	0.759268	0.763832	0.759748
37	0.496435	0.489890	0.496057	0.490223
38	0.651908	0.639454	0.651648	0.640091
39	0.661377	0.654071	0.660975	0.654576
40	0.873268	0.869457	0.872721	0.869858
41	1.023549	1.021153	1.023024	1.021764
42	1.241638	1.232686	1.241020	1.233549
43	1.108563	1.096638	1.107953	1.096367
44	0.325017	0.323293	0.324797	0.323596
45	1.083898	1.076212	1.083311	1.076986
46	0.945463	0.939145	0.945000	0.939864
Compl. Imp.	0.746079	0.719897	0.745608	0.719328
Wages	1.188270	1.192293	1.188049	1.193596
Salaries	1.133101	1.134703	1.132699	1.135763
Profits	1.165492	1.159762	1.165279	1.161056

find that in this condition the sectors which possess more than the average FOLs are all agricultural sectors food , paper, leather and petroleum products, coal, crude, fertiliser, pesticides, other chemicals among the manufacturing sectors and the railway , other transport, electricity and communication services . While all the other sectors provide less than the average FOLs.

6.8.3 Income Linkages

As in case of the output linkages, for estimating income linkages also the net income and consumption in three classes have been made endogenous. The Backward Income Linkages with Endogenous Income (BILEs) are presented in Table 6.11. From this table we observe that with growth in complementary imports as per growth rates indicated in the Eighth FYP of India, the BILEs increase only in 12 sectors while they decrease in the other 34 sectors. The BILE due to exports also go down with growth in imports and the BILEs due to the income received by all the three income groups also go down in this situation. On the other hand when the exports grow in the primary sectors then the BILEs increase in 11 sectors and the BILE due to the exports go up but BILEs due to 35 production sectors and three income receiving sectors go down. It may be noted here that all the sectors in these two cases in which the BILEs show increase happen to be non-agro- based manufacturing sectors and one service sector, viz.the other transport service sector. When both the complementary imports and exports of primary products grow then also almost similar trend is experienced except that in case of the BILE due to exports also show a decline. Thus we can infer

Table 6.11: Backward Income Linkages of Various Sectors and Exports With Alternative Trade Scenario

Sector Number	Usual Trade	Growth in Imports	Growth in Exports	Growth in Both
1	1.141679	1.134775	1.141663	1.134765
2	1.008145	1.005072	1.008134	1.005066
3	1.078956	1.069689	1.078935	1.069675
4	0.993872	0.986613	0.993855	0.986603
5	1.108705	1.099359	1.108685	1.099346
6	1.079582	1.069338	1.079561	1.069324
7	1.092742	1.082166	1.092721	1.082153
8	0.996468	0.990876	0.996460	0.990870
9	1.068765	1.059443	1.068748	1.059432
10	1.007507	0.999613	1.007499	0.999607
11	1.016332	1.007840	1.016318	1.007830
12	1.070587	1.062885	1.070572	1.062875
13	1.056024	1.048361	1.056014	1.048353
14	1.000220	0.993656	1.000206	0.993647
15	1.167438	1.160842	1.167425	1.160835
16	0.745080	0.740506	0.745072	0.740501
17	0.968905	0.961837	0.968891	0.961828
18	1.008539	1.000850	1.008524	1.000840
19	1.095519	1.085694	1.095499	1.085681
20	1.029514	1.025281	1.029505	1.025276
21	1.237922	1.229882	1.237907	1.229873
22	0.844312	0.841572	0.844307	0.841570
23	0.873329	0.869934	0.873323	0.869931
24	0.952879	0.954921	0.952980	0.954971
25	1.102183	1.096361	1.102177	1.096356
26	0.708733	0.735569	0.708748	0.735581
27	0.805730	0.806086	0.805726	0.806085
28	0.798375	0.796265	0.798373	0.796264
29	0.832862	0.841789	0.832867	0.841795
30	0.773791	0.767880	0.773780	0.767872
31	1.049108	1.087928	1.049126	1.087944
32	1.092097	1.098689	1.092112	1.098690
33	1.378116	1.470133	1.378151	1.470171
34	1.009962	1.012890	1.009981	1.012897
35	0.922946	0.954408	0.922956	0.954422
36	0.709259	0.708619	0.709253	0.708612
37	0.945635	0.954847	0.945649	0.954851
38	1.070991	1.067009	1.071002	1.067014
39	0.821747	0.823229	0.821740	0.823227
40	0.850462	0.870731	0.850466	0.870734
41	1.076434	1.071853	1.076429	1.071848
42	1.002498	0.997118	1.002501	0.997119
43	1.006025	1.000175	1.006014	1.000169
44	1.065769	1.062416	1.065769	1.062419
45	1.121450	1.111306	1.121429	1.111292
46	1.051788	1.042702	1.051770	1.042690
Exports	1.017073	1.016556	1.017267	1.016683
Wages	1.069718	1.062784	1.069706	1.062776
Salaries	1.045216	1.038793	1.045205	1.038786
Profits	1.028987	1.022834	1.028974	1.022825

that the economy may show higher income generating trend in large scale secondary sector only with increasing share of trade and the exports are likely to become less income intensive with growth in trade. But most of the sectors may lose in income generating intensity with increase in the share of trade.

The Forward Income Linkages with Endogenous Income-Distribution and Consumption (FILEs) have been estimated on the analogous pattern as in case of BILEs above with the help of expanded endogenised Output Inverse as defined in chapter 2. The estimates of FILEs are presented in Table 6.12. From this table we observe that in case the complementary imports are increased the FILEs increase only in six sectors viz. three mining sectors, iron & steel, coal mining and coal tar products sectors. However the FILEs due to the complementary imports increase as well as that due to the income received by the wage and salary earners show increases. However if the exports increase then the FILEs increase only in three sectors ,viz. agricultural crops other than cereals and pesticides sector. In such case the FILE due to the complementary imports as well as that due to all the income receiving sectors show decline . It indicates that with growth in trade, income linkages may decrease in most of the down-line production sectors . When both imports and exports grow then the FILE increase in seven sectors consisting of mostly the mining based sectors. But the FILEs due to the income receiving sectors as wages and salaries increase and the same due to the complementary imports also show increasing trend.

**Table 6.12 : Forward Income Linkages of Various Sectors
and Complementary Imports With Alternative Trade Scenario**

Sector Number	With Usual Trade	Growth in Imports	Growth in Exports	Growth in Both
1	1.389344	1.384149	1.389176	1.385697
2	1.381706	1.371117	1.381637	1.372673
3	1.420572	1.410160	1.427362	1.418473
4	1.439693	1.431130	1.440754	1.433973
5	1.285259	1.279909	1.285084	1.281303
6	1.274867	1.266555	1.274217	1.267573
7	1.382974	1.373196	1.392020	1.383658
8	1.218451	1.225136	1.217779	1.225409
9	1.443661	2.024136	1.443036	2.024861
10	0.829371	0.867867	0.828811	0.867755
11	0.843558	0.777012	0.842918	0.768084
12	1.183021	1.182777	1.182694	1.183757
13	1.257916	1.254729	1.257492	1.255746
14	1.161212	1.159788	1.160899	1.160723
15	1.191950	1.187312	1.191555	1.188213
16	1.061350	1.059022	1.061031	1.059868
17	1.223258	1.219297	1.222850	1.220251
18	0.974735	0.964723	0.974326	0.965118
19	0.641245	0.635018	0.640887	0.635420
20	1.102816	1.080809	1.102278	1.081555
21	0.940863	0.931363	0.940511	0.931548
22	0.819057	0.812410	0.818691	0.812867
23	0.817992	0.807027	0.817645	0.807460
24	1.142376	1.082965	1.142098	1.083254
25	0.562682	0.600429	0.562360	0.600610
26	1.402890	1.352613	1.403072	1.354507
27	1.366766	1.332353	1.366894	1.334124
28	0.722453	0.717131	0.722136	0.717646
29	1.150961	1.113156	1.150525	1.113730
30	0.568135	0.566838	0.567731	0.567214
31	0.793217	0.785577	0.792850	0.785636
32	0.558702	0.701136	0.558325	0.701242
33	0.720775	0.413624	0.720337	0.372414
34	0.439135	0.439487	0.438905	0.439682
35	0.452057	0.442187	0.451742	0.442367
36	0.822068	0.816740	0.821580	0.817212
37	0.471647	0.466735	0.471376	0.467013
38	0.717269	0.704097	0.716987	0.704695
39	0.676774	0.670504	0.676436	0.670958
40	0.897579	0.893674	0.897117	0.894053
41	1.053630	1.052003	1.053179	1.052565
42	1.322141	1.313123	1.321557	1.313939
43	1.137936	1.126265	1.137418	1.126083
44	0.358480	0.356126	0.358266	0.356416
45	1.316572	1.304763	1.315836	1.305618
46	1.097450	1.088797	1.096906	1.089540
Compl. Imp.	0.591218	0.579150	0.591025	0.578578
Wages	1.150072	1.154902	1.149942	1.155983
Salaries	1.099255	1.101908	1.098975	1.102794
Profits	1.122866	1.119049	1.122747	1.120119

Thus we find that the income linkages are likely to be adversely affected in most of the agricultural ,manufacturing and service sectors as well as for the income received by the higher income group in case of the further growth in international trade.

6.8.4 Labour Linkages

Since the income generated and its distribution among the various income groups in the population also affects the further demand , the employment and income generation. The semi-closed Input-Output Framework will help in understanding the likely effect on the employment generation in the economy. Some rates of growth of imports and exports have been assumed in the Eighth Five Year Plan. If these rates are achieved, what repurcussions will be felt on the employmnet generation front among the various income-groups is presented below.

The Backward Labour Linkages in the expanded Semi-closed model with endogenous income distribution and consumption (BLLEs) under three different conditions have been analysed. Table 6.13 below discusses the BLLEs of the various sectors, the exports and the income received by the three income-groups e.g. wage earners, salary earners and earners of primary inputs in the form of profits, rent and interests. From this table we observe that the BLLEs due to only 13 sectors increase if the imports increase and in case of 33 sectors the BLLEs decrease. Further the BLLEs due to exports, income received by all of the three classes also go down. On the other hand if the exports increase then also it results in similar picture except that the BLLEs due

Table 6.13 : Backward Labour Linkage of Various Sectors
and Exports With Alternative Trade Scenario

Sector Number	Usual Trade	Growth in Imports	Growth in Exports	Growth in Both
1	1.399203	1.376468	1.399101	1.370149
2	0.996232	0.994124	0.996216	0.993255
3	1.084192	1.074908	1.084151	1.072382
4	0.967323	0.961969	0.967298	0.960503
5	1.118956	1.109267	1.118915	1.106704
6	1.047441	1.039488	1.047410	1.037543
7	1.083874	1.074125	1.083837	1.071769
8	0.983327	0.978594	0.983315	0.977657
9	1.042017	1.034530	1.041993	1.032948
10	0.994000	0.986945	0.993989	0.986015
11	1.046619	1.036397	1.046583	1.034025
12	1.051501	1.045197	1.051477	1.043695
13	1.045230	1.038315	1.045213	1.037113
14	1.013168	1.005997	1.013138	1.004142
15	1.164770	1.158546	1.164747	1.157136
16	0.729441	0.725964	0.729431	0.725305
17	0.963560	0.957013	0.963535	0.955470
18	1.005219	0.997953	1.005190	0.996152
19	1.181356	1.166448	1.181295	1.162599
20	1.018321	1.014966	1.018307	1.014171
21	1.241890	1.233896	1.241860	1.232104
22	0.827407	0.825932	0.827402	0.825812
23	0.869819	0.866755	0.869810	0.866183
24	0.942755	0.942771	0.942951	0.952147
25	1.088845	1.083882	1.088836	1.083138
26	0.694859	0.722393	0.694892	0.724974
27	0.789730	0.791250	0.789728	0.791323
28	0.780784	0.779795	0.780785	0.779858
29	0.820442	0.830389	0.820455	0.831818
30	0.756234	0.751553	0.756217	0.750480
31	1.065447	1.103128	1.065476	1.105821
32	1.076883	1.083439	1.076915	1.083874
33	1.369726	1.461907	1.369795	1.469218
34	0.994583	0.997900	0.994623	0.999570
35	0.902770	0.935513	0.902796	0.938398
36	0.688276	0.688702	0.688270	0.687781
37	0.927273	0.936903	0.927305	0.937947
38	1.045043	1.042714	1.045070	1.044121
39	0.796725	0.799992	0.796719	0.799995
40	0.837446	0.858213	0.837457	0.858948
41	1.065618	1.061682	1.065612	1.061129
42	0.999215	0.994094	0.999222	0.994417
43	0.977198	0.973310	0.977186	0.972571
44	1.065161	1.061239	1.065161	1.061700
45	1.095948	1.087674	1.095915	1.085637
46	1.044310	1.035971	1.044277	1.033958
Exports	1.015463	1.015151	1.015835	1.038606
Wages	1.154245	1.142189	1.154198	1.139212
Salaries	1.092366	1.083169	1.092330	1.080911
Profits	1.037765	1.031258	1.037738	1.029593

to the exports increase. So obviously if both these conditions happen simultaneously then also almost similar picture emerges except that BLLEs decrease in one more sector. Thus we find that the BLLEs come down in case of growth in trade in case if either import or export grow or the both. The growth in BLLE takes place in secondary sectors and none of the primary or service sectors gain in BLLE due to the growth in trade. Thus we can infer that the growth in trade may be important for increasing the backward labour linkages in the manufacturing sectors.

On the other hand, when we analyse the FLLEs in the above three situations we observe the position as explained in Table 6.14 . If the imports increase, the FLLEs decline in most of the sectors except in 5 sectors. The sectors in which the FLLEs increase are 3 among mining sectors and 2 from the manufacturing sectors. The FLLEs due to the complementary imports, income received by wage earners and profit earners decrease and the same due to the salary earners goes up marginally. In the second situation when the exports increase the FLLEs increase only in four primary sectors while the same due to the complementary imports, income generated go down. However when both the imports and exports increase as envisaged, the FLLEs increase in 6 sectors and those due to the income earned by the wage and salary earners. The same due to the imports and the income of the profit earners go down. Thus we find that in terms of the FLLEs most of the sectors may provide less labour linkages in case of growth in trade.

Table 6.14 : Forward Labour Linkages of Various Sectors
and Complementary Imports With Alternative Trade Scenario

Sector Number	With Usual Trade	Growth in Imports	Growth in Exports	Growth in Both
1	2.743528	2.704099	2.741743	2.705954
2	1.295453	1.285825	1.295485	1.287083
3	1.490180	1.477009	1.497052	1.485261
4	1.314106	1.307367	1.315342	1.309895
5	1.476118	1.465012	1.475711	1.466233
6	1.182125	1.175019	1.181570	1.175717
7	1.206206	1.199722	1.215683	1.210084
8	1.033124	1.038528	1.032656	1.038552
9	1.227970	1.861523	1.227587	1.861924
10	0.599875	0.634333	0.599576	0.634029
11	0.778814	0.722911	0.778236	0.715272
12	1.183679	1.182536	1.183343	1.183300
13	1.299721	1.294545	1.299237	1.295341
14	1.269023	1.264135	1.268574	1.264910
15	1.216576	1.210423	1.216142	1.211120
16	1.017219	1.015141	1.016945	1.015775
17	1.212437	1.207760	1.212031	1.208482
18	0.929165	0.919730	0.928800	0.919968
19	1.166785	1.147069	1.165792	1.147569
20	0.992212	0.972938	0.991793	0.973422
21	0.976177	0.965824	0.975773	0.965930
22	0.730225	0.725200	0.729956	0.725479
23	0.816599	0.804727	0.816246	0.805027
24	1.222116	1.162496	1.221736	1.162728
25	0.508455	0.538928	0.508190	0.538991
26	2.012657	1.925364	2.012117	1.927241
27	1.501628	1.458577	1.501598	1.460144
28	0.615696	0.612383	0.615498	0.612712
29	1.081372	1.043946	1.081008	1.044321
30	0.457207	0.458532	0.456926	0.458726
31	0.873334	0.863787	0.872862	0.863805
32	0.443419	0.561516	0.443170	0.561459
33	0.576616	0.325660	0.576339	0.290929
34	0.391699	0.393029	0.391520	0.393131
35	0.301476	0.295583	0.301332	0.295613
36	0.621637	0.619491	0.621376	0.619712
37	0.367331	0.364469	0.367178	0.364608
38	0.570032	0.560945	0.569918	0.561334
39	0.522839	0.519708	0.522677	0.519963
40	0.782007	0.778369	0.781672	0.778552
41	1.003915	1.001108	1.003512	1.001475
42	1.231278	1.222998	1.230788	1.223538
43	1.050968	1.039680	1.050542	1.039396
44	0.361666	0.358872	0.361444	0.359079
45	1.047370	1.040553	1.046936	1.041022
46	0.976098	0.969159	0.975686	0.969632
Compl. Imp.	0.605647	0.594232	0.605432	0.593723
Wages	1.350504	1.350098	1.350132	1.351069
Salaries	1.107913	1.109606	1.107616	1.110302
Profits	1.257778	1.249508	1.257495	1.250444

Thus we observe that the labour intensity is expected to go down in most of the sectors in case the imports and exports grow as envisaged. However backward and forward labour linkages of some of the manufacturing sectors and the primary sectors respectively may increase in case the imports and exports grow in future.

6.8.5 Changes in Costs and Prices

When we analyse the price aspect in the endogenous model incorporating the income accrual and consumption of various income classes in the inter-industry matrix alongwith the international trade, the following picture emerges. Such price change which incorporates the inflationary aspects due to demand pull are presented in Table 6.15. It has been presented in 3 situations as above . From these results we observe that with the envisaged growth in imports all sectors are positively affected in terms of reduction in price or inflation. In fact in case of all the sectors the price increase is likely to go down with growth in imports and in 6 sectors this decline is likely to be significant. These sectors are petroleum products, iron & steel, non-ferrous metals, non-electrical and electrical machinery and other transport equipments. In case of growth in exports of primary products ,the price effect is likely to be very marginal and it is also likely to be positive in all sectors. Further in case of growth in imports as well as that of exports , the price effects are likely to be beneficial.

The growth in trade is also likely to positively affect the labour costs in all the three types ,i.e., wage

Table 6.15 : Price Change in Various Sectors and Complementary Imports With Alternative Trade Scenario

Sector Number	Usual Trade	Growth in Imports	Growth in Exports	Growth in Both
1	1.185994	1.147404	1.185621	1.147065
2	1.042080	1.011495	1.041742	1.011184
3	1.129699	1.095522	1.129361	1.095215
4	1.040176	1.009238	1.039858	1.008948
5	1.174209	1.138692	1.173859	1.138374
6	1.134698	1.098998	1.134361	1.098692
7	1.149117	1.112274	1.148775	1.111964
8	1.144941	1.107596	1.144602	1.107290
9	1.163596	1.125330	1.163251	1.125018
10	1.132909	1.091770	1.132564	1.091461
11	1.110139	1.073882	1.109809	1.073583
12	1.163116	1.127078	1.162768	1.126761
13	1.167598	1.127724	1.167242	1.127403
14	1.118385	1.084994	1.118059	1.084697
15	1.278181	1.237539	1.277790	1.237184
16	0.920973	0.895117	0.920724	0.894890
17	1.087353	1.054020	1.087037	1.053733
18	1.104883	1.070570	1.104558	1.070273
19	1.187196	1.150453	1.186850	1.150139
20	1.209935	1.171455	1.209586	1.171139
21	1.397238	1.353251	1.396830	1.352881
22	1.042145	1.015402	1.041853	1.015134
23	1.258236	1.223679	1.257935	1.223407
24	1.269684	1.151987	1.269089	1.151486
25	1.279550	1.237089	1.279169	1.236745
26	0.832190	0.824747	0.831896	0.824463
27	0.960151	0.939424	0.959869	0.939162
28	1.058185	1.027596	1.057901	1.027339
29	1.033177	1.010233	1.032864	1.009942
30	0.895873	0.870318	0.895621	0.870089
31	1.244043	1.184099	1.243620	1.183726
32	1.334334	1.270747	1.333904	1.270369
33	1.701986	1.563368	1.701402	1.562892
34	1.210974	1.160803	1.210562	1.160434
35	1.146617	1.108507	1.146258	1.108180
36	0.834489	0.826995	0.834248	0.926763
37	1.199610	1.153818	1.199234	1.153480
38	1.244950	1.184874	1.244537	1.184511
39	0.993840	0.969552	0.993561	0.969294
40	1.030202	1.015827	1.029886	1.015525
41	1.246645	1.205301	1.246269	1.204961
42	1.176528	1.130516	1.176158	1.130185
43	1.174898	1.138287	1.174562	1.137982
44	1.238136	1.190603	1.237752	1.190259
45	1.201719	1.164491	1.201366	1.164171
46	1.122355	1.088321	1.122022	1.088017
47	1.146335	1.107397	1.145484	1.106632
48	1.148917	1.110479	1.148562	1.110157
49	1.153611	1.116771	1.153264	1.116456
50	1.146691	1.111654	1.146351	1.111346

sector, salary sector as well as the management-owner/entrepreneurs sector. At the over-all level, the cost of primary inputs is likely to comparatively decrease with growth in trade. Thus we find that the growth in trade is likely to reduce prices and further boost the international trade due to increased international competitiveness of the Indian exports as a result of reduced costs. It may ultimately help in increasing production in many sectors in the economy over the years in future.

6.8.6 Summary & Conclusions

Based on the above results the following conclusions emerge and the policy makers may be advised to take appropriate decisions arising out of these inferences.

- 1.If the foreign trade increases in future, the backward linkages of production will go down in most of the primary sectors, service sectors and to the wage goods sectors.
- 2.The growth in foreign trade in future is likely to result in reduction in forward linkages in most of the sectors ,but the opportunities for increases in wages will increase. The forward output linkages due to the essential imports will also come down in such case.
- 3.With respect to the structure of production in future in India it can be projected that the share of agricultural and agro-based manufacturing sectors is likely to go down if the situation with regard to capital formation remains as at present. However the concentration of production in a few sectors is likely to come down and more new sectors will gain in importance.

4. The sectors considered important for development of infrastructure are likely to get more emphasis in future e.g. construction, non-electrical machinery, iron & steel, transport services and other manufacturing sector. The traditional sectors like, cereals, other services, animal husbandry, textiles, other food products, other chemicals etc. are likely to lose comparatively in importance.

6. The prices are likely to increase at lesser rate in future if the share of trade increases in future. The metal based sectors will be the main gainers in terms of prices. The labour cost out of the total cost of production is likely to go down in future with increase in growth of trade.

7. The distribution of income and structure of consumption seems to affect the structure of production significantly, as the endogenous model shows significant difference in income and labour linkages compared to the model excluding the same.

8. Taking into consideration the plough-back effect of income generated in the economy in the form of consumption, it has been observed that some sectors in machinery production and services may gain in backward labour and income linkages. Most of the primary sectors and agro-based industries lose in backward labour as well as income linkages in the event of growth in the share of trade 1996-97.

9. With the likely growth of trade in future, most of the sectors lose in forward labour and income linkages barring a few.

10. The forward labour and income linkages of income received by lower and middle income groups increase, while the backward linkages decrease with the growth in the share of trade. Which shows that the labour and income generation potential may increase in wage-goods sectors only and not in consumer durable goods. Further the labour and income linkages of the sectors producing most of the wages and salaries are likely to go down with growth in trade.

11. The backward labour linkages of exports increase while the backward income linkages decrease with the growth of trade. It indicates that the employment potential of exports is likely to go up without the commensurate growth in income growth potential.

12. The forward labour linkages due to the complementary imports decrease while the forward income linkages increase with growth of trade. It may convey that the utility of the essential imports in providing additional employment potential will come down, while the potential for additional income of the same is likely to increase.

13. The backward as well as forward labour and income linkages due to the income received by the highest income group go down with growth of trade. From this we may infer that the labour and income potential in the domestic economy may not grow due to additional income of the highest income class.

Thus we find that the changes in the policy with respect to the foreign trade in future is likely to affect the structure of production in the Indian economy very significantly. Consequent to the changes in structure of production, the

employment and income generation in the economy is also likely to change in very significant way. Therefore the policy changes in this field may be done after due analysis of the resultant effects in all these areas. The main findings of this study in general for the Indian economy as a whole and for the specific sectors which are important in respect of the liberalisation of trade will be presented alongwith some specific recommendations to the policy makers in the next chapter. The guidelines for further research in this area are also suggested besides the perspective on international trade and the specific contributions of this study in this connection in the chapter 7.

Table 6A.1 : Anticipated Annual Rate of Growth of Output in the Future

(Output in Rs. Million)

Sector Number	G.Output 1991-92	G.Output 1996-97	A.G.R % 1991-96	G.Output 2000-01	A.G.R. % 1996-2000
1	451703.2	547081.1	3.905782	546165.0	-0.04189
2	34511.66	42875.44	4.435593	43611.10	0.426219
3	15774.11	20132.46	5.000254	21530.34	1.692407
4	368436.4	444430.1	3.821709	451773.7	0.410557
5	245148.1	314115.6	5.082935	306130.7	-0.64166
6	71456.95	67847.30	-1.03135	132141.3	18.13444
7	27388.68	38411.02	6.998315	37817.23	-0.38872
8	38410.71	47530.16	4.352623	73499.10	11.51369
9	62233.84	103339.6	10.67463	144790.6	8.797355
10	2506.373	3169.022	4.803524	4317.196	8.036158
11	15990.57	19527.46	4.077379	35526.10	16.13829
12	47771.02	62100.15	5.386655	65634.30	1.393369
13	11616.75	13761.87	3.447158	14733.63	1.720414
14	213221.0	251287.5	3.339935	269440.2	1.759004
15	193125.5	260497.3	6.167772	246910.0	-1.33028
16	122257.8	184994.6	8.636679	195476.6	1.387376
17	13263.36	19639.92	8.167603	28724.43	9.970934
18	103672.2	153067.2	8.104549	163608.8	1.678963
19	35374.61	54631.79	9.081412	94235.23	14.60193
20	45346.14	64481.26	7.294788	79231.21	5.284805
21	29034.98	76444.99	21.36277	63708.97	-4.45391
22	55257.23	85305.33	9.073037	91411.60	1.743408
23	15758.91	26747.96	11.16110	33778.02	6.007331
24	147955.4	183323.9	4.380082	258211.4	8.940426
25	12969.98	17772.71	6.503242	36010.99	19.30821
26	60970.43	80096.43	5.608477	82913.34	0.867862
27	8025.219	10760.21	6.040758	14010.97	6.822274
28	14450.71	43616.64	24.72473	75264.30	14.61308
29	172758.6	251254.8	7.779197	295067.1	4.100209
30	33666.16	50325.02	8.372245	98829.00	18.37911
31	38857.37	61092.26	9.471872	107930.9	15.28954
32	171251.4	266430.9	9.242116	521363.1	18.27389
33	24171.56	33413.55	6.689962	68107.62	19.48634
34	119748.0	175946.6	7.999685	480678.6	28.56372
35	100148.7	160243.3	9.856798	238759.9	10.48296
36	55002.58	72172.70	5.583967	107666.9	10.51654
37	58064.83	107139.7	13.03357	233890.2	27.58511
38	28138.42	45393.39	10.03696	67410.29	10.39092
39	44711.81	120922.4	22.01604	247773.9	19.64296
40	145467.5	244404.3	10.93499	368427.9	10.80539
41	59073.19	72114.99	4.070351	89067.56	5.420116
42	222406.0	334202.9	8.485758	515197.8	11.42712
43	155142.6	229221.5	8.119705	308927.6	7.745796
44	357515.0	462693.7	5.293088	922369.2	18.82362
45	26430.64	37134.51	7.037015	52232.14	8.903047
46	1432640.	1977586.	6.659527	2356092.	4.475440
Imports	274334.1	409041.7	8.317233	640224.2	11.85132
Total	5708827.	7938682.	6.816983	10740399	7.849464

A.G.R = Annual Growth Rate

G.Output = Gross Output

Table 6A.1 : Anticipated Annual Rate of Growth of Output in the Future

(Output in Rs. Million)

Sector Number	G.Output 1991-92	G.Output 1996-97	A.G.R % 1991-96	G.Output 2000-01	A.G.R. % 1996-2000
1	451703.2	547081.1	3.905782	546165.0	-0.04189
2	34511.66	42875.44	4.435593	43611.10	0.426219
3	15774.11	20132.46	5.000254	21530.34	1.692407
4	368436.4	444430.1	3.821709	451773.7	0.410557
5	245148.1	314115.6	5.082935	306130.7	-0.64166
6	71456.95	67847.30	-1.03135	132141.3	18.13444
7	27388.68	38411.02	6.998315	37817.23	-0.38872
8	38410.71	47530.16	4.352623	73499.10	11.51369
9	62233.84	103339.6	10.67463	144790.6	8.797355
10	2506.373	3169.022	4.803524	4317.196	8.036158
11	15990.57	19527.46	4.077379	35526.10	16.13829
12	47771.02	62100.15	5.386655	65634.30	1.393369
13	11616.75	13761.87	3.447158	14733.63	1.720414
14	213221.0	251287.5	3.339935	269440.2	1.759004
15	193125.5	260497.3	6.167772	246910.0	-1.33028
16	122257.8	184994.6	8.636679	195476.6	1.387376
17	13263.36	19639.92	8.167603	28724.43	9.970934
18	103672.2	153067.2	8.104549	163608.8	1.678963
19	35374.61	54631.79	9.081412	94235.23	14.60193
20	45346.14	64481.26	7.294788	79231.21	5.284805
21	29034.98	76444.99	21.36277	63708.97	-4.45391
22	55257.23	85305.33	9.073037	91411.60	1.743408
23	15758.91	26747.96	11.16110	33778.02	6.007331
24	147955.4	183323.9	4.380082	258211.4	8.940426
25	12969.98	17772.71	6.503242	36010.99	19.30821
26	60970.43	80096.43	5.608477	82913.34	0.867862
27	8025.219	10760.21	6.040758	14010.97	6.822274
28	14450.71	43616.64	24.72473	75264.30	14.61308
29	172758.6	251254.8	7.779197	295067.1	4.100209
30	33666.16	50325.02	8.372245	98829.00	18.37911
31	38857.37	61092.26	9.471872	107930.9	15.28954
32	171251.4	266430.9	9.242116	521363.1	18.27389
33	24171.56	33413.55	6.689962	68107.62	19.48634
34	119748.0	175946.6	7.999685	480678.6	28.56372
35	100148.7	160243.3	9.856798	238759.9	10.48296
36	55002.58	72172.70	5.583967	107666.9	10.51654
37	58064.83	107139.7	13.03357	233890.2	27.58511
38	28138.42	45393.39	10.03696	67410.29	10.39092
39	44711.81	120922.4	22.01604	247773.9	19.64296
40	145467.5	244404.3	10.93499	368427.9	10.80539
41	59073.19	72114.99	4.070351	89067.56	5.420116
42	222406.0	334202.9	8.485758	515197.8	11.42712
43	155142.6	229221.5	8.119705	308927.6	7.745796
44	357515.0	462693.7	5.293088	922369.2	18.82362
45	26430.64	37134.51	7.037015	52232.14	8.903047
46	1432640.	1977586.	6.659527	2356092.	4.475440
Imports	274334.1	409041.7	8.317233	640224.2	11.85132
Total	5708827.	7938682.	6.816983	10740399	7.849464

A.G.R = Annual Growth Rate

and G.Output = Gross Output

Table 6A.2 : Anticipated Annual Rate of Growth of Income in the Future

(Gross Value Added in Rs. Million)

Sec No.	GVA in 1991-92	GVA in 1996-97	A.G.R. (%) 1991-96	GVA in 2000-01	A.G.R. (%) 1996-2000
1	288986.4	328232.8	2.579577	327683.1	-0.04189
2	21619.50	25471.23	3.333432	25908.27	0.426219
3	12347.63	14912.61	3.847009	15948.05	1.692407
4	279078.0	330250.5	3.424535	335707.5	0.410557
5	104885.7	123426.0	3.308979	120288.5	-0.64166
6	66110.78	62473.31	-1.12546	121674.8	18.13444
7	23136.84	29477.14	4.963010	29021.46	-0.38872
8	27939.18	34195.68	4.124163	52879.10	11.51369
9	52140.00	81773.45	9.417869	114573.9	8.797355
10	2121.674	2593.784	4.100075	3533.543	8.036158
11	13282.92	15420.99	3.030012	28055.25	16.13829
12	8926.195	9766.274	1.815174	10322.07	1.393369
13	3056.371	3214.466	1.013763	3441.449	1.720414
14	37295.71	41072.10	1.947741	44039.09	1.759004
15	74650.44	96907.45	5.357378	91852.84	-1.33028
16	31301.08	41650.30	5.879469	44010.24	1.387376
17	3629.393	4350.591	3.691424	6362.970	9.970934
18	59646.59	84048.23	7.099782	89836.54	1.678963
19	14129.98	21560.91	8.819083	37190.75	14.60193
20	15661.43	21788.61	6.826660	26772.72	5.284805
21	8862.907	23366.64	21.39590	19473.67	-4.45391
22	16697.60	25949.33	9.218054	27806.82	1.743408
23	4615.116	6338.292	6.551098	8004.162	6.007331
24	7883.616	8835.561	2.306147	12444.87	8.940426
25	1014.652	1132.006	2.213046	2293.667	19.30821
26	14002.25	17768.57	4.879586	18393.48	0.867862
27	2531.299	3008.894	3.517244	3917.908	6.822274
28	3720.316	10185.25	22.31463	17575.54	14.61308
29	54370.80	80041.99	8.041454	93999.23	4.100209
30	12635.82	19319.10	8.862097	37939.12	18.37911
31	19953.20	31090.76	9.275733	54927.65	15.28954
32	39222.03	60122.40	8.918397	117650.0	18.27389
33	3869.460	4849.398	4.618260	9884.642	19.48634
34	35787.89	48408.88	6.227699	132250.9	28.56372
35	33255.38	46841.92	7.091389	69793.66	10.48296
36	25519.02	33228.86	5.421759	49570.65	10.51654
37	18067.00	32256.82	12.29155	85471.57	27.58511
38	12471.56	18860.24	8.623861	28007.91	10.39092
39	16596.27	30096.05	12.64184	61667.75	19.64296
40	77240.03	121901.8	9.555346	183761.2	10.80539
41	24642.16	28786.21	3.300527	35800.20	5.420116
42	100670.5	145539.2	7.650373	224359.2	11.42712
43	69818.10	104498.9	8.399863	140835.8	7.745796
44	120858.6	153154.8	4.850516	305310.5	18.82362
45	21032.99	27628.69	5.606789	38861.58	8.903047
46	1108005.	1494679.	6.169857	1780757.	4.475440
Total	2993290.	3950676.	5.707192	5089862.	6.539003

GVA = Gross Value Added

and A.G.R. = Annual Growth Rate

Projection of Trade-Balance

The projection of trade-balance has been attempted in this exercise by projecting the exports, competitive imports and complementary imports separately. While the complementary imports have been estimated with the help of the " Semi-Closed Dynamic Input-Output Trade Model " as developed in this study as given in Table 6.1 alongwith the gross output. The competitive imports are not inside the technical coefficient matrix. The exports are although within the transaction matrix ,but the final demands for the future period are not projected as such the exports are to be projected separately under some assumptions. These have been estimated as below.

The competitive imports have been estimated with the assumption that the self-sufficiency ratios for the year 2000 A.D. will be same as in 1996-97 and the ratio of the competitive imports to the total domestic demand for various sectors will remain at the same level. The exports have been estimated with the assumption that the proportion of exports out of total output for various sectors will remain same during 2000 A.D. as these were during 1996-97. As such with the help of these proportions and the projected output for 2000 A.D., the value of exports at 1984-85 prices have been estimated. We get the following estimates for the trade-balance for the year 2000-01.

Exports = Rs.802.3 Billion , Competitive Imports = Rs.640.2 Billion.,Complementary Imports = Rs.318.5 Billion,
 Trade-balance = Rs.156.5 Billion (about 19.5 % of total exports).

CHAPTER 7

CONCLUSIONS, MAJOR FINDINGS AND RECOMMENDATIONS

7.1 Introduction

This chapter summarises the work done in this study and provides conclusions, major findings for the economy as a whole and specifically for certain important sectors and the recommendations about appropriate policies in relation to international trade to the policy makers so as to maximise the domestic production, income and employment generation and to make the Indian economy internationally competitive in terms of prices.

7.2 Perspective of the Study

In this study we have analysed some aspects of the Indian economy e.g. perspective of trade scenario in the form of import intensity and export capability under different policy regimes and the same have been projected in terms of linkages for the future period ,so as to get an idea about the same in case of alternative situations and policies with regard to foreign trade. It helps us to understand the position of the economy in general and the various sectors in particular with regard to their capability to minimise the trade balance at present and also in future. The perspective of production in the economy has been analysed in the form of direct, indirect and induced backward as well as forward multipliers ,linkages of production of various

sectors for different periods under different policy regimes. It enables us to identify the sectors in which production may get boost and the other sectors which may be vulnerable in the condition of liberalised trade scenario. Overall we are able to understand the situation about the growth prospects of Indian economy at present and in future.

The studies in the area of impact of international trade on output, income, labour etc. have been generally done in the past by treating foreign trade as foreign to the domestic production scenario. As it has been explained in chapter 2 that some of the imports are essential for the domestic production with the contemporary technology and resource base, which do not change in the short run. Similarly , it is essential to export some goods or services in exchange for the imports. As such, international trade functions as a facilitator not only for further growth in production in any economy but also for the welfare of the concerned society in general. There may however be both types of effects on a particular economy due to liberalisation of trade depending upon the internal strengths/weaknesses of economy with regard to competitiveness, efficiency, costs of production and level of price rise. Therefore it is important to study the impact of trade on any economy in terms of its effects on various parameters of the economy. There may be some leakages of production, income and employment also due to some of the imports ,which could be produced in the economy or avoidance of which may not affect the domestic production significantly. It is also important to substitute such imports for planning growth of domestic economy in various fields.

For studying the enabling and disabling aspects of essential imports and exports it is important to include the essential and regular type of imports (defined as complementary imports in this study) and the exports within the transaction matrix rather than treating these as exogenous variables. In fact the complementary imports can not be treated as exogenous and the exports are inextricably linked to these imports and the structure of production in the economy. This model with endogenised trade consisting of the complementary imports and exports can be termed as " Semi-Closed Input-Output Trade Model". This treatment helps us to estimate the indirect and induced backward output, income and labour multipliers , linkages of exports as well as the forward output, income and labour multipliers/linkages of complementary imports. These parameters provide us the estimates of domestic contribution (positive or negative) of imports and exports in the respective areas. Further this treatment helps us to analyse the direct, indirect and induced impacts of complementary imports/exports on backward/forward output, income and labour multipliers/linkages of various production sectors. The earlier studies are unable to provide the indirect and induced income and labour linakges due to exports and the complementary imports. This procedure also helps us to estimate the overall (dierct, indirect and induced) import-intensity and export capability of the economy and that of the specific sectors. The Semi-Closed Input-Output Trade Model can also be used for estimation of prices in the various sectors and imports also.

The dynamic version of this model , the **Dynamic Semi-Closed Input-Output Trade Model** (designe with the help of an extended capital-coefficient matrix constructed including the import vector) , enables us to project the expected value of output, employment, income ,imports, exports and price-increase in the economy and in various domestic sectors. The value of essential imports , exports in a future year can be estimated by this dynamic model and the resultant trade-balance also can be pojected , so that the policy makers may be appropriately advised for designing appropriate policies . The methodology has been explained in chapter 2 and the specific model and various formulae used for estimation of backward/forward multipliers/linkages , rate of change in prices have been provided in chapter 4. The endogenous model also helps us to analyse the sensitivity of the economy in various areas with respect to the changes in the policies regarding trade, income distribution, taxes etc. The linkages of income received by the various income-groups in the economy depending upon their consumption elasticities in these fields can be estimated with the help of the endogenous trade and consumption model.

This model has been utilised to estimate the direct, indirect and induced backward /forward output, income ,labour linkages ,prices and costs in the various sectors as well as for the economy as a whole . The overall labour linkages help us to identify the sectors which are most important for the growth potential of employment in the economy in future. Further we are able to understand the extent of effect of growth of complementary imports/ exports on employment potential of the economy and which sectors are to be watched carefully so as to

maintain labour intensity of the economy at the appropriate level? Similarly the income linkages provide us the comparative position of various sectors with regard to income generation potential during different periods so as to identify the important sectors for growth of income in the economy under the condition of liberalised trade. We have analysed the effects on various entities as mentioned above under the different alternative situations with respect to the trade liberalisation policies, i.e. (i) by way of liberalisation of imports, (ii) by way of export promotion only, and (iii) by way of both. The effects on the income received by the various sections of Indian society under different income classes ,viz. (a) workers,wage earners, (b) salaried employees and small entrepreneurs and (c) earners of rent, interest and profit (large businessmen , entrepreneurs and managers). The effects of various trade policy reforms on these groups in terms of impact on labour, income and prices have been analysed in this study. It helps us to compare the alterntive policies and choose the better policy among them to maximise the gains due to trade liberalisation for the Indian economy in terms of growth in production, employment, and income with its appropriate distribution among the three groups and to contain cost of production and prices in the economy so as to make the economy more internationally competitive.

The study has made efforts to evaluate the effects of the liberalisation of two types of imports in terms of loss of potential production over the years so as to identify the sectors and items feasible and important for containing imports and for growth in domestic production in future without adverse effects

on the domestic production , employment and income in the economy. The factors important for the present structure of production (output), employment and income have been analysed and compared with regard to their relative positive / negative contributions for growth in the concerned parameters of the economy under different policy regimes. It helps us to identify the strengths and weaknesses of the trade liberalisation policy with respect to the various sectors and to various parameters. The study discusses the important sectors with respect to the various parameters based on the above analysis.

7.3 Major Findings of the Study

In this section we shall discuss the major findings of this study in respect of the impact of international trade on the structure of production, income, employment and prices in the Indian economy. The major findings may be divided in to seven parts as presented below. We shall discuss these in that order.

1. Perspective on international trade in the Indian Economy ;
2. Impact on output and its structure ;
3. Impact on income generation and its structure ;
4. Impact on employment and its structure ;
5. Impact on Prices and International Competitvity ;
6. Factors of growth in various parameters of Indian economy ; and
7. Future scenario with regard to various parameters of the Indian economy .

7.3.1 Perspective on International Trade

In this sub-section we shall present the major findings regarding import-intensity and export-capability of the Indian economy vis-a-vis the trade liberalisation policies during the recent past.

7.3.1.1 Import Intensity

We have found that the import intensity of the Indian economy has been increasing over the years and particularly significantly after the mild trade liberalisation. It is important here to note that the import intensity of intermediate consumption of the economy as a whole was increasing earlier at a fast rate, but it is likely to come down gradually after the liberalisation of trade. However the import-intensity of final consumption particularly that of private consumption is growing at much faster rate after the liberalisation of trade. The competitive imports have been growing at a faster rate and those too for the private consumption. The imports used for capital formation are also increasing at a fast pace.

It has been found that although the output multipliers of various sectors come down but comparatively the output linkages generally increase in absence of competitive imports. It shows that the competitive imports could be substituted without much adverse effect to the Indian economy and in this process not much additional alternative imports will be necessary. However by substituting competitive imports the import intensity in some

of the sectors will increase, but the export capability of many sectors would increase. Such effect on exports will grow and effect on imports will decrease after the trade liberalisation. On the other hand ,if the complementary imports are substituted , the alternative imports those would be required would be very significant and the net gain in that process in terms of import saving will be little. The net loss of potential production is quite significant due to the leakage effect of imports used for final demand particularly those of competitive type. As such significant additional gross output can be generated if the competitive imports particularly those which are used for final demand (specially for private consumption) are reduced gradually.

Although the direct import-intensity of some sectors particularly that of agricultural sectors is increasing with trade liberalisation, nevertheless, the overall import-multiplier of the economy as a whole has been coming down after the major trade liberalisation. The overall import-intensity of the economy increased after the mild liberalisation of trade but it is gradually decreasing after 1991-92 and it is further likely to come down with liberalisation of trade. The coefficient of variation (C.V.) explaining the dispersion among various sectors in import-intensity has also been coming down over the years although it increased a bit after 1984-85, however the same has been going down after 1991-92. It shows the stability of the trend since the decline in import-intensity is wide-spread rather than confined to a few sectors. The efficacy of complementary imports for inducing additional production in the economy has been coming down over the years and particularly after the mild

liberalisation, but it is likely to go up after the major liberalisation gradually. It indicates less efficient use of essential imports in the liberalised environment, which hints at more strict monitoring the use of essential imports.

7.3.1.2 Export Capability

With regard to export potential of the economy we have observed that the export capability of the economy has been growing over the years. Further it is growing at a comparatively faster rate after the trade liberalisation. The proportion of output exported has been growing at a fast pace after change in economic policies during 1991-92. It has also been noted that the distribution of exports over the sectors has been highly skewed. While its distribution tended to become more wide-spread till 1984-85, the same is tending to become more skewed again after the major trade liberalisation. It shows that the Indian economy is still dependent on a few sectors for exports. The Export multipliers of the economy are growing at a much faster rate after the trade liberalisation. It shows that the export potential of the economy has increased very fast after the trade liberalisation. It has also been observed that the C.V. of export multipliers of the various sectors is coming down after the trade liberalisation while the same was going up earlier. Thus it shows that the export potential which is growing in the economy is likely to be stable and is wide-spread among the various sectors and not confined to a few sectors. However it has also been observed that the direct import-intensity of the exportable goods and services has been increasing at a faster rate after the

major trade liberalisation. It may nevertheless be stated that the complementary import multipliers of the economy have been growing even before the trade liberalisation began during 1984-85. Nonetheless, the exports are becoming more import-intensive over the years.

Another very important aspect of trade liberalisation has been its impact on self-sufficiency of the economy. It has been observed that the self-sufficiency as defined by the ratio of the total domestic output to the total domestic demand of the economy has increased to greater than unity since 1991-92 and it is further increasing afterwards.

Further the export capability of the complementary imports is increasing at a faster rate after the trade liberalisation. Thus the export potential from the domestic sectors as well as due to the imports is increasing for the economy after the trade liberalisation. With regard to the backward output multipliers of exports we have observed that although it came down after the mild liberalisation of trade as compared to growth observed in it during the pre-liberalisation period, the same is increasing after the major liberalisation of trade during 1991-92.

7.3.2 Impact on Output and its Structure

We have found that the output multipliers of the domestic economy ,which came down marginally after the mild trade liberalisation, have started to increase after the major trade liberalisation. The backward as well forward output

multipliers (BOM, FOM) were going up prior to liberalisation of trade, however the same are likely to reach the same level during 1996-97 as those were before liberalisation. Further the C.V. of both BOMs, FOMs have come down after the major trade liberalisation. It shows that while the output multipliers prior to trade liberalisation were distributed among a few sectors, the same are much more wide-spread after 1991-92. The BOM due to the exports and FOM due to complementary imports which were coming down till 1991-92, are tending to marginally increase since then. Thus we see that the trade liberalisation has induced faster growth of output in the economy.

The structure of production in the economy has undergone significant change over the past decade and a half. While the shares of some of the primary sectors increased before trade liberalisation and only those of a few of the secondary sectors increased , after the trade liberalisation the shares of most of the agricultural, mining and food products are going down comparatively and those of the machinery, equipments based sectors are increasing. The shares of railway transport, construction and other services are coming down while those of the other transport, electricity and communication are increasing. Thus we have observed that the output in the modern and organised sectors is likely to grow faster.

7.3.3 Impact on Income and its structure

The impact of the trade liberalisation on income generation in the domestic economy seems to be of mixed nature. While the overall Backward Income Multipliers (BIM) for the

economy are likely to come down after the major trade liberalisation, while the same were going up till 1991-92 (i.e. during the mild liberalisation of trade), the Forward Income Multipliers (FIM) are likely to increase significantly after major trade liberalisation. The BIM due to exports are also going down after 1991-92 while the same were increasing before that period. But the FIM due to complementary imports are regularly decreasing over the years and very significantly after the trade liberalisation. Thus the international trade is tending to contribute progressively less and less towards domestic income-growth in upstream production sectors and significantly in the down-line production stream of sectors. The exports and complementary imports are also tending to be less effective in generating additional income in the domestic economy after the trade liberalisation.

With regard to the structure of income generation we have observed that the share of the primary sectors in income is going down over the years and that of the modern secondary sector and particularly the export-oriented sectors is going up specially after the liberalisation of trade. Thus we observe that the structure of income distribution in the economy is also becoming more skewed after trade liberalisation because the income being generated in the primary sectors (the share of which is going down) is being distributed widely and the same from the organised sectors , which is being distributed comparatively narrowly due to decreasing labour intensity of these sectors and their shares are going up.

7.3.5 Impact on Prices

The impact of trade liberalisation on prices (in terms of the cost of production) in the domestic economy appears to be significantly positive and is quite wide-spread. The fear that it may lead to higher prices in non-traded goods sectors (due to less production owing to decreased anticipated demand) and may lead to comparatively cheaper rate for traded goods have proved to be false. Tautologically the complementary imports are observed to be much cheaper after trade liberalisation particularly after 1991-92. The effects are however somewhat worrying for the period after the major trade liberalisation, since more sectors are showing higher expected rise in cost of production than that observed during the mild liberalisation phase. Although compared to the pre-liberalisation phase the increase in prices is limited to very few sectors, still it is important to note that the increase in prices is occurring in agricultural (foodgrains and animal husbandry), mining, leather products (mostly providing the wage goods) and the prices are decreasing in most of the secondary sectors except a few metal based sectors. Overall however the domestic production is becoming more internationally competitive over the years and particularly after the trade liberalisation.

7.3.6 Factors of Growth of Various Parameters

We have found that the growth in final demand (FDG) factor has been the predominant factor for growth in output, employment and income generation in the Indian economy during the

pre-liberalisation phase. The export-growth (EG) factor also contributed positively towards all the above parameters during this period. However the import substitution and technological change factors contributed negatively for all the above parameters during the pre-liberalisation phase. After the mild level of trade liberalisation during 1984- 1991 (i.e. before the major liberalisation policy of 1991), it was observed that the positive contribution of export-growth towards the above parameters marginally decreased and the negative contribution of import-substitution also got reduced , however the effect of technological change remained almost unaffected. It indicates that the mild level of liberalisation of trade was not very effective in improving the contribution of trade for the Indian economy. In fact the overall contribution of trade towards all the parameters became marginal during this period, as against small positive contribution during the pre-liberalisation phase. The mild level of trade liberalisation also did not affect the negative effects due to the technological change in either way . It might have been due to the inability of domestic economy to produce goods and services for meeting the requirement of the economy in terms of output, employment and income due to the inadequacy of many essential inputs, raw materials and their high cost. Further the increased incentives to exports in terms of export-subsidies might have necessitated more imports.

But after the major trade liberalisation, we find that all the four factors for growth of output and income are contributing positively towards output ,income and employment. The share of FDG has come down very significantly for all the parameters in the economy, while that of export-growth (EG)

factor has become very significantly positive. Besides, the IS and TC factors are also contributing positively for all the parameters of the domestic economy. It might be due to the easy availability of imported inputs and raw materials at less cost, duties ,which would have caused increased production of various goods and services at less cost without many bottlenecks. Further the reduction in uncertainty about the availability of imported inputs might have reduced the bottlenecks in production , the inventory level and the resultant costs. As such it would be possible to substitute many more items of imports in the long run without creating the necessity of additional alternative imports. This policy might have also induced further investment in many capital-intensive sectors with the help of foreign collaboration and equity. Further the inter-connectivity of the economy increased which might have contributed to the positive contribution of TC factor towards the domestic economic parameters.

The growth in labour productivity (LPG) factor has been the most employment-inhibitive factor over the years in the Indian economy. It has become further entrenched after the trade-liberalisation. With the trade and industrial liberalisation in the Indian economy particularly after 1991, we have found that this factor alone has adversely affected labour-intensity. Although it is obvious that the LPG factor will lead to decline in employment ,but the R & D can help in designing such appropriate equipments so as not to decrease the labour-intensity to the present extent and still the output can be produced to meet the domestic demands. It is possible in many sectors which

are internationally competitive and cost-effective in spite of being labour-intensive. Further special efforts may be made to decrease the capital-intensity subject to capability to produce the required amount of output for the domestic needs with adequate efficiency and costs in some sectors e.g. agricultural sectors, agro-based industries and service sectors.

We have found that the Indian economy may not be too much dependent on the domestic final demand and it may get significant boost from exports in terms of growth in domestic output, employment and income with increased trade liberalisation and further import substitution will also be possible without adverse effects on any of the above parameters. The new technology will also complement the efforts of the domestic economy in the above task for growth of output, income and employment with reduced costs of production .

7.3.7 Future Scenario

We have found with the help of Dynamic Semi-Closed Input-Output Trade Model , the likely structure of production and income, import-intensity, export capability, output linkages, labour-linkages, income-linkages and changes in costs and prices in the economy and in the various sectors which are presented below.

7.3.7.1 Structure of Output and Gross Value Added

We have found that the agricultural and agro-based sectors are likely to lose in respect of comparative shares in the economy in the future in terms of output and gross value

added. The modern metal based machinery & equipment sectors , transport, construction and communication services are likely to gain in importance in the future. The gross output is likely to grow at higher rate (at about 7.8% per annum at constant prices) in the next four to five years and the GVA is also likely to grow at about 6.5% per annum at constant prices as against about 5.7% during 1991-92 to 1996-97.

7.3.7.2 Output Linkages

We have found that the backward output linkages of the agricultural , mining, sugar, cement, non-metallic mineral products, electricity and communication sectors are likely to go up in future. The most important sectors for providing the backward output linkages will be coal mining, non-metallic mineral products, communication, cement, coal tar products foodgrains, electricity, construction, sugar, other food products, cotton textiles, leather and petroleum products, iron and steel, non-ferrous metals, and motor vehicles sectors. The backward output linkages of exports are however anticipated to decrease significantly after 1996-97 ,while the same were tending to increase during 1991-92 to 1996-97.

7.3.7.3 Income Linkages

We have found that the backward income linkages are likely to go down in most of the sectors in the future. The same are likely to increase in foodgrains, fibre crops, coal mining, iron ore, sugar, coal tar products, synthetic fibre & resin ,non-

metallic mineral products, iron and steel, rail transport service, electricity and communication sectors. The backward income linkages due to exports are also likely to decrease significantly after 1996-97. It was earlier estimated that the same would increase during the period 1991-92 to 1996-97. Thus we have found that the income linkages of the economy and its exports are likely to go down in future.

7.3.7.4 Labour Linkages

We have found that the overall labour-intensity of the economy and various sectors will increase in the future in the long run after significant decline in the next few years. It may reach back to the same level or marginally higher to that as was during 1991-92. The compound labour intensity is likely to increase in almost all sectors except forestry, non-metallic minerals & products, wood products and the construction sectors which may experience significant decrease in their respective labour-intensity in the future. The labour-intensity of exports is also likely to increase after 1996-97, while it was going down during the just preceding period. Thus we find that the Indian economy including its exports are likely to become comparatively more labour intensive in future.

7.3.7.5 Import-Intensity

The essential type of imports (i.e.complementary imports) are likely to grow at about 12 % annual rate of growth at constant prices as against about 8.3 % during 1991-92 to 1996-

97. Further the competitive imports are also likely to grow at still higher rate if additional efforts are not made to curb non-essential imports in future. The import-intensity of agricultural and agro-based , cement and electricity sectors is likely to increase and that of metal products, machinery, motor and other transport equipments and construction sectors is likely to decrease in future. Further it has been found that the import-intensity of exports is also likely to go down very substantially after 1996-97. The most import-intensive sectors during the 2000 A.D. are anticipated to be coal mining, cement, coal tar products, other manufacturing, petroleum products, non-metallic mineral products, iron and steel, non-ferrous metals, electricity and construction sectors besides the exports.

7.3.7.6 Export capability

We have estimated the export multipliers for the future period for the economy as a whole and for the various sectors and found that the overall export capability in 2000 A.D. is expected to be marginally less than the same during 1996-97. The C.V. of the same is however likely to go down. The export capability of most of the agricultural sectors, coal & lignite, cotton textiles, wood ,leather and rubber products, coal tar products, fertilisers, pesticides, cement, non-metallic mineral products, iron & steel , non-electric machinery and the rail transport equipments sectors is likely to increase in 2000 A.D. Further the export capability of the complementary imports is also likely to go up in future. This shows that the export potential of the sectors providing the basic inputs, raw materials and the infrastructural inputs is likely to increase

in future. Although the overall export capability is likely to go down relatively, the same would be more widely distributed during 2000 A.D. as compared to the same during 1996-97. Based on this study we have found that the trade-balance will remain negative during the year 2000-01. The amount of the same is estimated to be around Rs. 150 billion, (i.e. about 19% of the total anticipated exports) at 1984-85 prices.

7.4 Identification of Important and the Key Sectors

In this section we shall present the results of our study by way of segregation of various sectors in terms of high, medium and low for various important parameters of the economy e.g. Import Intensity, Export Capability, Output Multipliers, Income Linkages and Labour Linkages during the current period and as they are likely to be in future .

7.4.1 Key Sectors for Intensity of Foreign Trade

This section enumerates the key sectors with regard to the import intensity and export capability in the Indian economy. It is important to identify the key sectors with regard to imports as well as exports for containing the trade balance in future. The sectors which are more import intensive particularly for the complementary imports may be given less priority compared to those which are less import intensive. On the other hand the sectors which are more capable to provide exportable goods and services are required to be provided necessary incentives. It may also help in increasing the share of the country in the world

trade and to improve the terms of trade for the domestic products.

7.4.1.1 Import Intensity

There are large number of sectors which are low in terms of compound import intensity in the Indian economy particularly after the trade liberalisation. With regard to the comparative position of key sectors with regard to import intensity over the three periods is presented in figure 7.1. We observe from this figure that there were 10 sectors with high import intensity during 1984-85 , i.e. before the liberalisation of trade, and although the number of such sectors came down to 8 after mild liberalisation, but the same is likely to increase again after 1991-92 to 12. These sectors are petroleum products, fertilisers, cement, non-metallic, metallic products, non-electric machinery, railway equipments, other transport equipments, other manufacturing , other transport and construction service sectors. Besides the above mentioned sectors, the export oriented sectors have high import intensity during all the three periods . So we should be careful while propagating exports and due consideration to import intensity of the concerned sectors may be given while deciding the export incentives to various sectors. The sectors which are in the medium range of import intensity are going down in number over the years with trade liberalisation. Such sectors are other food products, paper products, pesticides, other chemicals, electrical machinery, electronic and communication equipments and railway service sectors. All the other sectors are having low import intensity. Thus we observe that the primary

Figure 7.1

**The Sectors with Low, Medium and High Import Multipliers
During Different Period from 1984-85 to 1996-97**

Year Range	1984-85	1991-92	1996-97
Low (< .05)	1, 2, 3, 4-19, 21, 22, 25, 43, 45 and 46 (in all 25)	1-23, 25, 30, 36, 43, 45 and 46 (in all 29)	1-13, 15-19, 21-23 25, 28, 36, 43, 45, and 46 (in all 27)
Medium (0.05 to 0.1)	20, 23, 27-29 , 32, 37, 39-41 and 44 (in all 11)	5, 27-29, 32, 37-41 (in all 9)	14, 20, 27, 29, 35, 39 and 41 (in all 7)
High (> 0.1)	24, 26, 30, 31, 33-36, 38, and 42 and Exports (in all 10)	24, 26, 31, 33-35, 42, and 44 and Exports (in all 8)	24, 26, 30-34, 37, 38 40, 42 and 44 and Exports (in all 12)

The contents of the sectors given above by way of sector numbers

may be seen from the Annexure-3.1.

sectors, agro-based processing sectors, textiles are important sectors with regard to import intensity as these have low import intensity, as such these sectors may be given incentives for further growth in production in future. The export incentives may be given subject to the comparative import intensity of the various sectors as provided in the chapter 5.

7.4.1.2 Export Capability

The sectors which have high export potential have been identified and the comparative position during the three periods has been shown in figure 7.2. We observe from this figure that 6 sectors have comparatively low rate of export intensity during the post liberalisation period. Such sectors were more in number (18) prior to liberalisation was taken up during 1984-85. These sectors are foodgrains, animal husbandry products, sugar, gur & khandsari, cement and construction service sectors . Besides, there are another 7 sectors during the post liberalisation period which have medium level of export multipliers. The number of such sectors has also been going down with the trade liberalisation (from 14 during 1984-85 to 7 during 1996-97). These sectors are other crops, forestry, other food products, wood products, fertilisers, non-metallic mineral products, and electrical machinery sectors. All the remaining sectors are having high export multipliers after liberalisation. Those sectors need to be provided all the necessary incentives for further growth in view of their export-potential. These sectors are mostly from agricultural, mining, agro-based processing sectors, chemical-based ,metal based manufacturing, machinery and

sectors, agro-based processing sectors, textiles are important sectors with regard to import intensity as these have low import intensity, as such these sectors may be given incentives for further growth in production in future. The export incentives may be given subject to the comparative import intensity of the various sectors as provided in the chapter 5.

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Figure 7.2

The Sectors with High, Medium and Low Export Multipliers
 During Different Period from 1984-85 to 1996-97

<u>Range</u>	<u>Year</u>	1984-85	1991-92	1996-97
High (> 0.1)		3, 6, 9, 10, 11, 14, 17-19, 21, 29, 34, 37, 40 and Compl. Imports (in all 14)	2, 3, 7, 9, 10, 11, 15, 18, 21-24, 27-29, 33, 34, 38-42, 46 and Compl. Imports (in all 23)	2, 3, 7-11, 15-18, 20-25, 27-29, 32-34 36-43, 45, 46 and Compl. Imports (in all 33)
Medium (0.05 to 0.1)		2, 4, 7, 8, 15, 22, 24, 27, 32, 33, 36, 41, 43, 46 (in all 14)	4, 8, 14, 16, 17, 19, 20, 25, 31, 32, 35-37, 43, and 45 (in all 15)	4, 6, 14, 19, 26, 31, 35 (in all 7)
Low (< 0.05)		1, 5, 12, 13, 16, 20, 23, 25, 26, 28, 30, 31, 35, 38, 42, 44, 45 (in all 18)	1, 5, 6, 12, 13, 26, 30, and 44 (in all 8)	1, 5, 12, 13, 30, and 44 (in all 6)

The contents of the sectors as given here with the help of sector numbers may be seen from the Annexure-3.1

Compl. Imports = Complementary Imports

transport, other equipments, electricity, communication and other service sectors. These are important sectors for growth of exports from India.

It is pertinent to note here that the most of the agricultural (except foodgrains, animal husbandry) and mining, agro-based processing (except sugar, gur and khandsari) sectors figure in the key sectors both with regard to low import intensity as well as high export potentiality. Therefore these sectors are the key sectors for minimising the trade balance, and as such deserve the maximum attention for growth of production so as to maximise exports as well to minimise imports.

The overall key sectors with regard to foreign trade are the following.

The fibre crops, tea & coffee, fishing, coal, crude petroleum, metallic and non-metallic mining, cotton, silk, synthetic, woollen and other textiles and textile products, leather, rubber and plastic products, railway equipments, electricity and communication service sectors.

7.4.2 Important Sectors in Terms of Various Multipliers and Linkages

7.4.2.1. Output Multipliers

The important sectors in terms of the output multipliers have been identified as those which have high backward as well as high forward output multipliers over the years. We have presented these sectors schematically in Figures 7.3 (a) and 7.3 (b) respectively for the years 1984-85 and 1996-97, so as to

FIGURE 7.3 (a)

**Categorisation of Key Sectors on the Basis of
Backward and Forward Output Multipliers**

(During 1984-85)

Backward Linkage	High	Low
Forward Linkage		
High	17, 19, 21, 22, 24-27, 29-33, 37, 40 , 41 and 44 (in all 17 sectors)	2-4, 6, 8-11, and 43 (in all 9 sectors)
Low	12-16, 21, 23, 28, 34-36 , 38, 39 (in all 13 sectors)	1, 5, 7 18, 42, 45 and 46 and Foreign Trade *
		(in all 7 sectors)

* By low linkages of foreign trade ,we mean that the complementary imports have low forward output linkages , and the exports have low backward output linkages for the domestic economy.

FIGURE 7.3 (b)

Categorisation of Key Sectors on the Basis of

Backward and Forward Output Multipliers

(During 1996-97)

Backward Linkage	High	Low
Forward Linkage		
High	18, 20, 21, 23-27, 29, 31-35, 37, 39 and 42 (in all 18 sectors)	2, 3, 6, 8-11, 19, 22, 28, 30, 36, 40 and 45 (in all 14 sectors)
Low	12-17, 41, 43, and 44 (in all 9 sectors)	1, 4, 5, 7 and 46 and Foreign Trade *
		(in all 5 sectors)

* By low linkages of foreign trade ,we mean that the complementary imports have low forward output linkages , and the exports have low backward linkages for the domestic economy .

distinguish the impact of liberalisation of trade on the key sectors. We may observe from these figures that textiles , paper, leather, plastic, petroleum, coal tar products, fertilisers, pesticides, other chemicals, non-metallic and metallic products, machinery, motor , other transport ,other equipments and other transport service sectors are the important sectors during 1996-97. We observe that the number of key sectors have gone up from the pre-liberalisation period. On the other hand the sectors which have low backward as well as forward multipliers , which can be considered as the least important for growth of production in the economy, have come down in number during 1996-97 as compared to the earlier period. Such sectors are foodgrains, other crops, animal husbandry, fishing and other service sectors. The sectors which have high forward but low backward multipliers are likely to increase after the liberalisation of foreign trade as can be seen from these figures. The food products, textiles, railway transport, electricity and construction service are the sectors which have high backward , but low forward linkages. On the other hand the export oriented products e.g., tea & coffee, fibre crops, minerals, wood ,rubber products, synthetic fibre and resin, cement, railway equipments, other manufacturing and communication sectors have low backward but high forward multipliers. We therefore can infer that for future growth of production, machinery , transport and other equipments, fertilisers, pesticides, textile products, chemicals and modern products used in processing industries need to be given high priority.

From these figures we also observe that the complementary imports and exports do not have very high

forward/backward output multipliers. The position has not improved with the liberalisation of trade, as such it can be stated that the international trade has not been very effective in stimulating growth of output in the Indian economy so far.

7.4.2.2 Income Linkages

The income generation in the economy at growing rate is one of the most important economic parameters. The segregation of key sectors with regard to this aspect has been shown in Figures 7.4 (a) and 7.4 (b) respectively for the periods 1991-92 and 1996-97. We observe from these Figures that the number of sectors providing high income linkages to the domestic economy have increased after the trade liberalisation. Further we observe that fibre crops, tea & coffee, other crops, forestry, fishing, all mining sectors, textile products, wood and paper products, non-metallic mineral products, iron and steel , non-ferrous metals, other transport, electricity, communication and other servive sectors are the most important for growth of income in the domestic economy during 1991-97. We also observe that the exports are important for providing high backward income linkages while the complementary imports are comparatively less effective in generating additional income in the economy. The sectors which are the least important for income generation are gur & khandsari, synthetic and silk , woollen textiles, plastic, rubber and coal tar products, other chemicals, cement, electrical machinery and motor vehicles sectors. Thus we observe that the export oriented sectors and the sectors providing basic raw materials and infrastructural goods and services for the

FIGURE 7.4 (a)

**Categorisation of Key Sectors on the Basis of
Backward and Forward Income Linkages**

(During 1991-92)

Backward Linkage	High	Low
Forward Linkage		
High	2 , 6-11, 18-20, 28, 31, 41-43, 45 and 46 (in all 17 sectors)	3 , 4, 26, 27, 29, 3, 36 and 40 (in all 8 sectors)
Low	1, 5, 14, 15, 21, 32, 38, and 44 and Foreign Trade (in all 8 sectors)	11, 13, 16, 17, 22-25, 30, 34, 35, 37, and 39 (in all 13 sectors)

* By linkages of foreign trade, we mean the forward income linkages of complementary imports, and the backward income linkages of exports for the domestic economy.

FIGURE 7.4 (b)

Categorisation of Key Sectors on the Basis of

Backward and Forward Income Linkages

(During 1996-97)

Backward Linkage	High	Low
Forward Linkage		
High	2 - 4, 6-11, 18-20, 31-33, 42, 43, 45 and 46 (in all 19 sectors)	26, 27, 28, 36, 39 and 40 (in all 6 sectors)
Low	1, 5, 12, 14, 15, 21, 24, 34, 38, 41, and 44 and Foreign Trade (in all 11 sectors)	13, 16, 17, 22, 23, 25, 29, 30, 35 and 37 (in all 10 sectors)

* By linkages of foreign trade ,we mean the forward income linkages of complementary imports ,and the backward income linkages of exports for the domestic economy.

manufacturing sectors are important for generating high level of income growth in the domestic economy.

7.4.2.3 Labour Linkages

In this sub-section we shall identify the important sectors in the Indian economy with respect to the employment potential. The sectors as classified with respect to high and/ or low backward and forward linkages have been depicted in Figures 7.5 (a) and 7.5 (b) for the periods 1991-92 and 1996-97 respectively. We can see from these figures that there are a few sectors which are providing high employment potential in the Indian economy. The number of such sectors is also going down over the years with liberalisation of trade. The foodgrains, tea & coffee, animal husbandry, non-metallic minerals, textile products, wood and non-metallic mineral products sectors are the important sectors keeping in mind the labour intensity. While the sectors which have high backward but low forward labour linkages are gur & khandsari, other food products, paper products and construction sectors. The sectors which have low backward but high forward labour linkages are fibre crops, forestry, coal and crude mining, petroleum products, fertilisers and pesticides sectors. All the remaining sectors are providing low labour linkages to economy. Thus we find that most of the agricultural, mining, un-organised agro/mineral-based processing sectors, construction, fertilisers and pesticides provide high labour intensity in the economy. Most of the modern organised sectors e.g. electricity, transport, communication etc. do not provide high labour multipliers as such while deciding about the

FIGURE 7.5 (a)

Categorisation of Key Sectors on the Basis of

Backward and Forward Labour Linkages

(During 1991-92)

Backward Linkage	High	Low
Forward Linkage		
High	1,2,3,5,11,18,19, and 31 (in all 8 sectors)	8,9,24,26,27, and 43 (in all 6 sectors)
Low	13,14, 15,20,21 and 44 and Foreign Trade (in all 6 sectors)	4,6,7 ,10,12,16,17,22 23,25,28,29,30,32,33, 34,35-42 ,43,45 and 46 (in all 26 sectors)

* By linkages of foreign trade ,we mean the forward labour linkages of complementary imports ,and the backward labour linkages of exports for the domestic economy.

FIGURE 7.5 (b)

**Categorisation of Key Sectors on the Basis of
Backward and Forward Labour Linkages**
(During 1996-97)

Backward Linkage	High	Low
Forward Linkage		
High	1 , 3,5,11,18,19, and 31 (in all 7 sectors)	2,6,8,9,24,26, and 27 (in all 7 sectors)
Low	13,14, 20 and 44 (in all 4 sectors)	4,7 ,10,12,15,16,17,21-23 25,28-30,32-43,45, 46 and Foreign Trade (in all 28 sectors)

* By linkages of foreign trade ,we mean the forward labour linkages of complementary imports ,and the backward labour linkages of exports for the domestic economy.

industrial and trade policies it should be kept in mind whether the concerned policies will enhance the employment potential in the economy or not. Further it has also been observed that the foreign trade in the form of complementary imports and exports also provide low employment linkages to the domestic economy and the same has been going down with liberalisation of trade. As can be seen that before the major liberalisation of trade, the backward labour linkages of exports were high as compared to the same during the period after 1991-92.

7.4.2.4 Overall Key Sectors for Domestic Parameters

We have analysed the sectors with regards to their importance for various economic parameters as above. We have found that the following sectors may be classified as the key sectors for all the domestic parameters put together.

- (i) The Key Sectors are The other textiles & textile products and non-metallic mineral products sectors;
- (ii) The sectors which can be considered as the second best key sectors are : The fibre crops, tea & coffee crops, non-metallic minerals and wood and products sectors ;
- (iii) The sectors which can be treated as the third best key sectors are : forestry, coal & lignite, crude petroleum and natural gas and construction service sectors.

7.5 Recommendations to the Policy Makers

Based on the empirical results of this study we can make certain recommendations to the policy makers for their consideration while reviewing and monitoring the reform process of the Indian economy. There are certain recommendations for the policies in general with regard to the liberalisation of international trade, attraction of foreign investment in India, delicensing in industry , privatisation or disinvestment in the public sector and research & development in the area of industries. Further there are some specific recommendations regarding key sectors in the economy with regard to foreign trade and for the other domestic economic parameters. Some sectors of critical importance for the future growth of output, income and employment have been identified and special treatment may be recommended for these sectors depending on the objective in view at the given time by the policy makers.

We have found that the growth of output and income in the economy as a whole has increased after the liberalisation of trade and industry in India in general and it is expected to grow at faster rate in future. Further the liberalisation has helped in controlling the rate of growth of cost of production, exports to grow at faster rates and as such the investment climate is looking better. Therefore the liberalisation of trade and industry in general should continue so as to make the Indian industry more efficient, progressive and internationally competitive. The overall import-intensity of domestic production is also likely to come down in future and so there should not be

great worry about the rate of growth of essential imports for intermediate consumption. But the import intensity of private consumption particularly that of competitive imports is going up at a very fast pace. Further the use of complementary imports is becoming less efficient over the years with liberalisation. As such it has been estimated that the trade-balance is likely to remain negative during the year 2000-01, which may not be sustainable. Therefore sustained efforts may be made to reduce the level of non-essential competitive imports particularly those used for private consumption.

It may however be stated here that the forward output linkages are not increasing in some of the agriculture sectors, which indicates that the down-line production stream is comparatively weak in case of agro-based sectors. It is therefore suggested that efforts should be made to develop more industrial ventures or small scale entrepreneurship so as to utilise raw materials and by-products more effectively in the domestic economy by producing additional items through diversification in many industries e.g sugar and agro-based industries in particular. However there are certain areas of concern as well, which are discussed in the next paragraphs.

The overall labour intensity is decreasing in the economy as a whole as well as in many sectors. It seems that the dichotomy between the small/ unorganised and the large/organised industrial sectors in Indian economy is being further strengthened after trade liberalisation. While the share of the former e.g. agricultural and agro-based industries, is likely to go down in total output and gross value added, such sectors are

providing large part of exports and are needing comparatively much less essential imports. On the other hand the latter provide for much less exports, need large amounts of various types of imports and their share in the economy is likely to further go up in future. It is therefore required that the capital intensity, which is increasing in most of the modern as well as traditional sectors should be checked through research and development, by way of indigenisation and adoption of the technology to the domestic conditions.

Another area of concern is the increasing proportion of imports being utilised for private consumption and Government consumption. It is pertinent to note that the use of essential imports is growing at the highest rate for private consumption, which is not developmental in nature. It is therefore required to curb such consumption, particularly the use of private passenger vehicles, some household durable assets and some fixtures in residential complexes. Besides the direct import of such items, even the domestic production of such items requires much more intermediate imports, fixed capital and energy indirectly. The import-intensity of final consumption needs to be reduced gradually through prudent tax measures.

In the pursuit of increasing exports we should not allow the import-intensity of exportable goods to increase without limit, as we have observed that the backward output, income and labour linkages of exports are going down over the years. It is not likely to be sustainable and the export-income also needs to be taxed prudently, as it is not likely to be equitably distributed, which may lead to conspicuous consumption. We have

observed that the backward /forward output, income and labour linkages of income in the highest income class are affected adversely with the growth of trade. Such consumption increases requirement of more imported items. The production of such goods does not provide adequate labour and income linkages for the domestic economy.

The competitive imports used for final demand can be substituted without requiring significant additional essential imports and as such it is possible to replace them by growing domestic production in the concerned sectors in the short period. However while trying to substitute the complementary imports, as defined in this study, much more additional alternative imports would be required. It is therefore recommended to the policy makers that concerted efforts may be made to increase production of substitutes for the competitive imports. The production in the primary sectors, agro-based products, textiles may be increased. These sectors have the least import intensity and high export potential at the same time. The sectors which should be provided enough incentives for export effort are agricultural sectors, mining, agro-based processing sectors, chemical based, metals, machinery and other transport equipments, electricity, communication and other service sectors.

The key sectors which are important with regard to labour intensity need to be given necessary incentives e.g. foodgrains, tea & coffee, animal husbandry, non-metallic minerals, textile products, wood products and non-metallic mineral products sectors. Further the other sectors which have high backward labour linkages e.g. gur & khandsari, other food

products, paper products and construction sectors are good for creating employment for low level of skills particularly in the rural and sub-urban areas and need to be provided special impetus in such areas. The sectors which have high forward labour linkages e.g. fibre crops, forestry, coal and crude mining, petroleum products, fertilisers and pesticides sectors can help in generating higher employment in the down-line stream of production and as such these sectors are also important for providing direct employment.

The liberalisation of trade is likely to provide boost for growth of income in down-line production sectors in future. The sectors which are the key sectors with regard to the domestic income objective are fibre crops, tea & coffee, other crops, forestry, fishing, all mining sectors, textile products, wood and paper products, non-metallic mineral products, iron and steel, other metals, other transport, electricity, communication and other service sectors. The growth of production should not be the only criterion for planning production and investment as it has been established that only this objective may not be sustainable in the future. Most of the sectors which are important for the objective of growth of output are least important for employment or income objectives. However we should choose such sectors out of the important sectors with growth of output objective which are also important sectors for labour and income objectives. Such sectors are textiles, leather products, fertilisers, non-metallic mineral products, other transport equipments and other transport service sectors.

Further we want to recommend to the policy makers that with growth in share of trade in the economy, the forward income and labour linkages of income received by the lower two groups are likely to increase. Therefore, the wage employment should be increased and there should be tax relief to the corporations with respect to the payment of wages and salaries. On the other hand the income and labour linkages of the income received by the earners of the profits, rent and interest are likely to go down in future, as such more taxes may be levied on such incomes and there should be more strict control on dividends, rates of interest and rents. Higher taxes on these may be levied. The control on industrial prices with the help of proper and regular estimation of industrial costs and prices and adequate provision for capital consumption on a scientific basis for various sectors may be done on priority. The average returns are increasing for the top level management cadre and owners, these should be properly monitored and channelised back into the economy.

7.6 Guidelines for future research

We have studied some aspects of the economy which are important with respect to impact of trade liberalisation policy viz. import-intensity, export capability, self-sufficiency of production in meeting the domestic demand, income, employment, and prices in the economy at large and in the various sectors. Besides the above ,there are certain other aspects which may also have significant impact of trade liberalisation. Some of them, which need to be analysed by further studies are the following.

(i) The small and large scale units in the same sectors are likely to have different impacts in the various branches of the economy due to the trade liberalisation. Since it requires separate intra-industry Input-Output tables for the same period with the same sectorisation and corresponding import-transaction tables, a separate study is called for this purpose.

(ii) The different regions in the country are likely to have vastly different impact of these policies. It is feared that the areas with better physical and economic infrastructure are likely to attract most of the new investment and there may be growth of developed enclaves in the vast domain of underdevelopment in the country. It may also lead to large scale migration of population from the perifery to the centers of development. It may also lead to skewed economic development, growing tensions and pollution in the enclaves of development in the country. For such study, a multi-regional I-O table is needed with corresponding intra-region and inter-region trade matrices of the same order. This may also be attempted in an exclusive study.

(iii) The liberalisation of trade may lead to higher capital intensity in the economy and as such it may drive the country to become much more dependent on the capitalist countries for technology, financial capital , research and development and other related aspects. This requires capital-coefficient matrices at regular intervals for the economy with sectorisation corresponding to that of the available I-O tables. As in this study only one capital-coefficient matrix could be prepared for one period, such study could not be done. It may be done with

some extra efforts and additional data from various government agencies. It may take some more time and manpower to compile such required tables, as such the study in this direction is also considered important whenever it may be feasible.

(iv) The liberalisation of trade may also lead to increased energy-intensity of the economy, which may become non-sustainable in not a distant future because of the limited and highly capital-intensive nature of energy production. Since the energy ratios for the alternative products in the same industry vary to a great extent, it is necessary to construct an intra-industry I-O model for such study so as to simulate the most appropriate and sustainable energy-use scenario for the future production. It has also to be in tune with the requirement of final demand of the domestic economy as well as to minimise the imports and to reduce cost of production in the various sectors.

Besides the above ,the impact of trade liberalisation on the income-distribution in the economy has not been taken as a causal factor in this study. For such study the data on sector-wise distribution of income into the various income groups for the different periods are needed. Therefore such study to analyse the impact on income-distribution can also be planned. These studies may also utilise semi Input-Output techniques or programming approaches or a combination of these . But the analysis should be done for the disaggregated economy, so that the various sectors may be appropriately advised to guard themselves against adverse effects of trade liberalisation, and the sectors which are likely to gain may be able to reap the maximum utility. The government may also take appropriate policy

decisions so as to be able to monitor those effects and help itself in developing the society equitably, with less social tensions and maximum human improvement in the shortest possible time.

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